May 28, 1945

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

TECHNOLOGY DEPT.

PUBLIC LIBRARY
MAY 28 1945
DETROIT

TINNERMAN PRODUCTS, INC., COOPERATES WITH THE TREASURY DEPARTMENT TO BRING YOU THIS SPECIAL MESSAGE ON THE

SEVENTH WAR LOAN DRIVE

TO THE AMERICAN PEOPLE:

Your sons, husbands and brothers who are standing today upon the battlefronts are fighting for more than victory in war. They are fighting for a new world of freedom and peace.

We, upon whom has been placed the responsibility of leading the American forces, appeal to you with all possible earnestness to invest in War Bonds to the fullest extent of your capacity.

Give us not only the needed implements of war, but the assurance and backing of a united people so necessary to hasten the victory and speed the return of your fighting men.

William D. Leahy
Douglas MacArthur
E. J. King
Dwight D. Eisenhower
C. W. Nimitz
H. H. Arnold

TINNERMAN PRODUCTS, INC.
2039 Fulton Road, Cleveland 13, Ohio

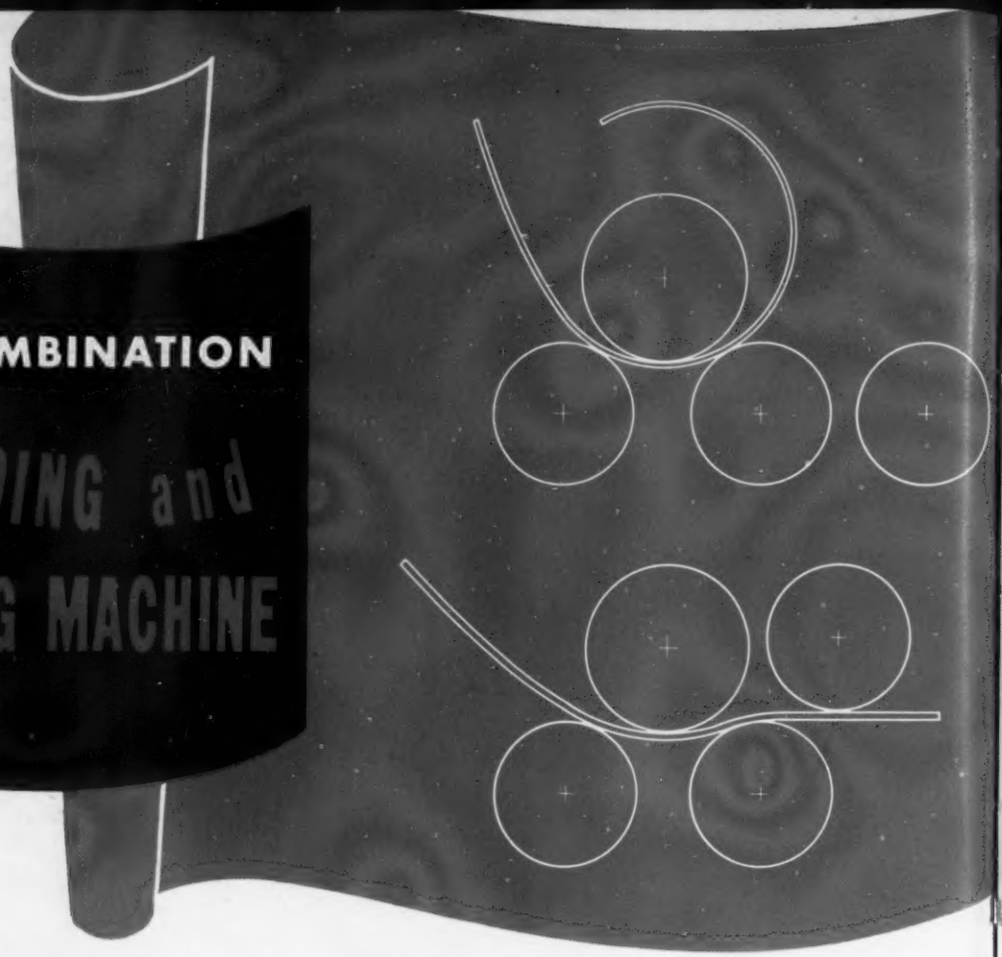
Manufacturers of patented SPEED NUTS, SPEED CLIPS, and SPEED CLAMPS used extensively on military aircraft, communications, ordnance equipment and other war material.

Speed Nuts
PATENTED
* Trade Mark Reg. U. S. Pat. Off.

FASTEST THING IN FASTENINGS

ANOTHER PRODUCT OF
AETNA-STANDARD . . .

FOUR-ROLL COMBINATION
PLATE BENDING and STRAIGHTENING MACHINE



Here's a machine which can be used for either bending or straightening of plates. By merely pressing the push-button control, an operator can convert the unit from 3-roll bending to 4-roll straightening *in a matter of seconds.*

Thus, when a curved plate needs to be straightened and recurved, the operator can do the complete operation without removing the plate from the machine.

Another feature is the ease with which a closed plate can be taken off the rolls. The outboard bearing support *swings in and out of position.* This mechanism, controlled by the hand wheel, eliminates the necessity for lifting the bearing support on and off.

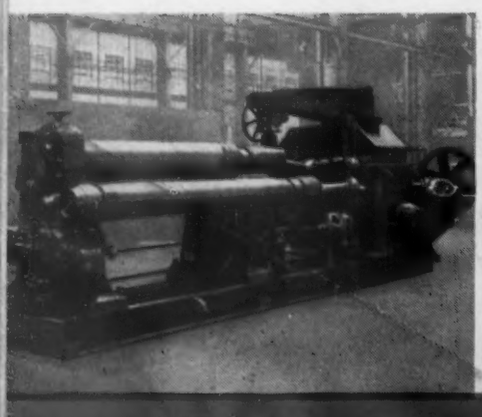
Other features of the Aetna design emphasize ease of operation and maintenance, such as the centralized grease system for all 9 bearings, the fully enclosed, self-lubricating drive, and the rigid construction. All rolls are connected to drives by flexible bearings or universal spindles.

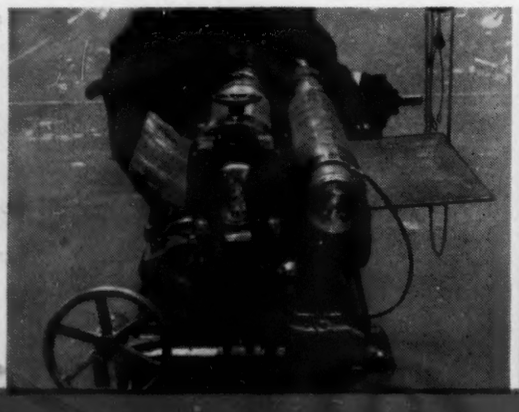
Aetna-Standard, exclusive manufacturer of piercing mills, builds 3-roll bending machines, in addition to 4-roll bending and straightening machines; also 2-high and 4-high sheet and plate levellers and many other products for the steel and non-ferrous industries.

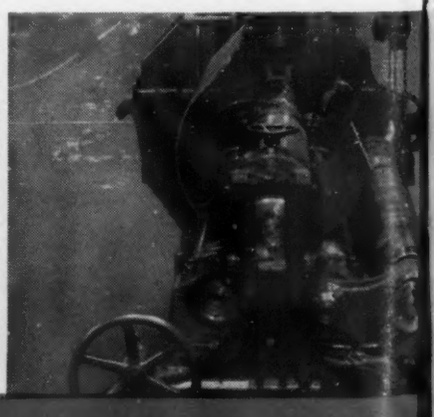
THE AETNA•STANDARD
ENGINEERING COMPANY
YOUNGSTOWN, OHIO

DESIGNERS AND BUILDERS to the Steel, Non-Ferrous and Chemical Industries.

ASSOCIATED COMPANIES:
HEAD, WRIGHTSON & COMPANY, LIMITED, THORNABY-ON-TEES, ENGLAND
JOHN INGLIS COMPANY, LIMITED, TORONTO, ONTARIO, CANADA







His part in the fight calls for *Hand Tools*

Photo courtesy Elastic Stop Nut Corp.

Bethlehem Furnishes Alloy Steels For Tools Like These:

Many millions of dollars and man-hours are poured into the production of planes, tanks, tractors, and other equipment for our armed forces. Most of us marvel at the speed with which they roll from assembly lines . . . at the grim efficiency with which they do their work.

And yet, despite the miracles of mechanized production lines, these engines of war could hardly be produced without the aid of hand-held service tools . . . socket wrenches, open-end and crescent wrenches, wire-cutters, pliers, and many, many others.

These tools, needed in vast quantities, are of course made of steel—to standard as well as individual specifications. Much of this steel (for both drop forgings and upset forgings) is being supplied by Bethlehem in bar form. Large tonnages will also be needed for similar tools in the postwar era.

The uses of Bethlehem alloys range from the tool kit to the giant bomber and the battleship. If you have a problem, large or small, involving special-alloy steels, feel free to consult with our metallurgists. Their services are at your disposal, both now and after the war.

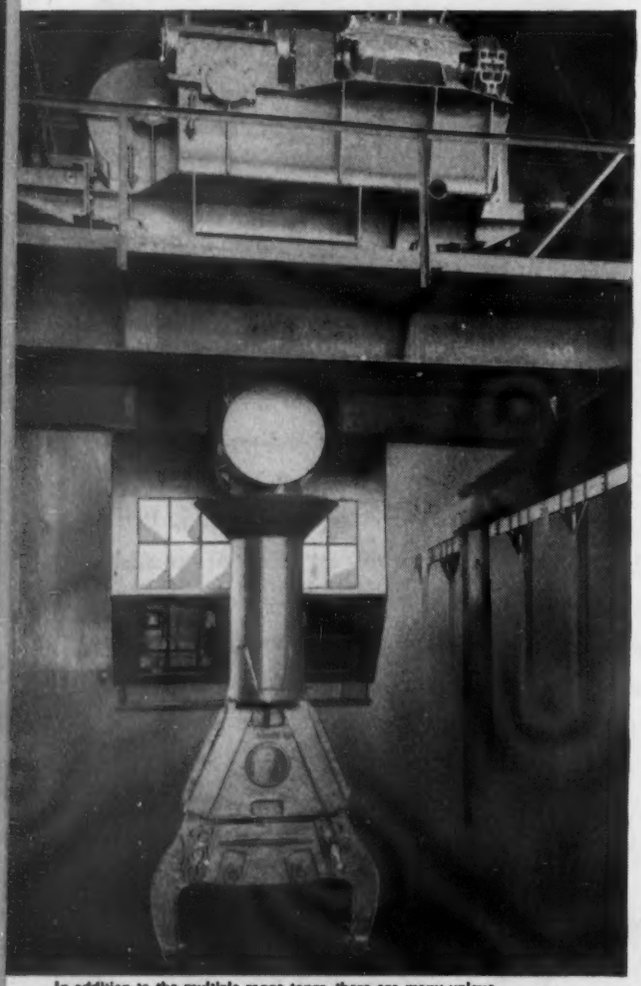
Bethlehem Steel Company, Bethlehem, Pa.
Bethlehem Steel Export Corp., New York City

BETHLEHEM *Alloy* STEELS

HERE'S SOMETHING *NEW* IN SOAKING PIT CRANES . . .

multiple range tongs

ARMY E NAVY



In addition to the multiple range tongs, there are many unique features on this new soaking pit crane, designed by Alliance.

The multiple range tongs, designed and patented by Alliance, represent an advancement in soaking pit crane design.

Alliance developed these new tongs to overcome the troublesome problem of charging and drawing many different size slab ingots with the same crane.

The tongs on this crane are fundamentally different from tongs on conventional soaking pit cranes. By means of an ingenious locking pin, the tongs can be adjusted, *in less than a minute,* to any one of four positions, providing a wide size spread:

> Position (1) takes care of ingots up to 10" x 22"; position (2) —18" x 40"; position (3) — 36" x 52"; and position (4) — 48" x 60".

Since size adjustments can be made quickly and easily, an operator can handle many more ingots in a given time. By gripping the slabs on the edges, bit marks are eliminated from the rolling surface.

The tongs have the same operating characteristics as a standard soaking pit crane. Consequently, Alliance can install the multiple range tongs *on any existing soaking pit crane, regardless of make.*

As world's largest builders of the world's largest cranes, Alliance has come up with many firsts in crane designing, such as the 4 girder interlocking drum ladle crane, the intensified grip soaking pit crane, and the combination push-pull stripper. The multiple range tongs represent another Alliance first.

We will be glad to discuss this new crane development with you.

THE ALLIANCE MACHINE COMPANY • ALLIANCE, OHIO

PITTSBURGH OFFICE : 1622 OLIVER BUILDING

MACKLIN GRINDING WHEELS.

"PROTECT YOUR PRODUCTION" with Macklin High Quality Wheels—made from the smallest to the largest—in all grains and grades, for every grinding purpose.

Ask for the services of a Macklin field engineer

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS — JACKSON, MICHIGAN, U. S. A.

Distributors in all principal cities

Sales Offices: — Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia

BEHIND THE SCENES

Cold Weather And Warm Welcomes

■ History does not record what manner of weather, or what manner of welcome the prophet Mahomet encountered when he made his memorable pilgrimage to the mountain. The Penton archives, however, do preserve records of unseasonable cold weather and refreshingly warm welcomes encountered by STEEL's team of "machine tool prophets" during their recent pilgrimage to the Green Mountains and other New England points.

Equipped—not with the traditional crystal ball—but with the preliminary findings from a nation-wide study on what metalworking plants expect in postwar machine tools, STEEL's men from Cleveland were bounced off the rattler in Albany at the crack of dawn, only to find a very pleasant bus ride through the mountains awaiting them, after a surprisingly good breakfast at the truck drivers' joint across the street from the station.

Taking a trip through New England with Guy Hubbard, machine tool editor of STEEL, is like having a personally conducted tour of Philadelphia with Ben Franklin as a guide. Guy is a native Vermonter, born and raised in the very locality which is the birthplace of the machine tool industry in America. It was a real pleasure to be with Guy as he revisited his old haunts and sat with his lifelong friends to discuss the past, present and future of the machine tool business.

From Springfield, Vt., where we enjoyed the hospitality of the Hartness House, one of New England's top notch "caravansaries", we went up to Windsor, Vt., on the other side of Mount Ascutney. Then on to Boston, Providence, Springfield, and Hudson, Mass., and finally down to Hartford and New Britain. And every day the wind blew harder and colder, but the warm receptions on every call, and the surprisingly good food encountered, kept our minds off the "March in May" weather.

This machine tool study by the editors of STEEL will appear as a special report in the June 25 issue. Based on the lively discussions we sat in on in the offices of the Yankee craftsmen of New England, we believe you will find it highly thought-provoking, intensely interesting, and a definite help in your own planning.

Cleveland's Liquid Salt Cellar

■ It's amazing what you can learn by reading magazines, even those other than STEEL. Going through the current issue of *Compressed Air*, we discovered much to our amazement that just about a half-mile up the lake front from the Penton building here in Cleveland, there is, of all things, a subterranean salt lake, which is actually being "mined" every day to the tune of 405 tons of salt. This salt lake is 1800 feet below the surface and is about 75 feet deep. Fresh water is forced down through the annular space between a casing and a 4-inch pipe, driving the brine up through the latter. The brine is then delivered to settling tanks, is processed and ends up as common table variety.

To think that we're right now sitting on top of a salt lake, and never even knew it!

Inexpensive Advice

■ Secretary of Commerce Henry A. Wallace is now ready to tell all about the metalworking business for 35c, according to an article he wrote for "Domestic Commerce", monthly bulletin issued by his department. He points out there is now available a small booklet entitled "Establishing and Operating a Metalworking Shop". Originally designed for the serviceman who intends to enter business for himself, the booklet is now available for civilians as well. According to Mr. Wallace, "In addition to those who are just establishing a metalworking shop, the publication should prove valuable to one who is already in the metal working business, since few undertakings are perfectly operated". Copies of the booklet are available for 35c from the Superintendent of Documents, Washington 25, D. C.

Humectant

■ And in the same publication which carried Mr. Wallace's story, we saw a new word. At least it's new to us, and don't you all write in to tell us how limited is our vocabulary, just because you knew all about it. In the ads it's called "apple honey", but in the lingo of the Department of Commerce it's a humectant. Before apple honey came along, the usual humectant was glycerine, which leads us to believe that a humectant is probably just a bureaucratic term for a moistening agent, because it isn't in our war-torn Webster. It's a good word, though, if we can only find a hole to put it in some day.

Drinks on High

■ In the postwar dream world, you'll be able to have bourbon & soda aboard your favorite airliner (if they'll let you) because of a new stainless steel vacuum container developed by TWA which "enables liquids of any consistency, degree of temperature or carbonization to be served at an altitude of 20,000 feet or more. This has been impossible heretofore because the containers were not air tight". We stole this little item from STEEL HORIZONS, the glamorous magazine published by Allegheny-Ludlum Steel Corp., and we hope they don't mind, because the bourbon is strictly our idea.

Complaint Dept.

■ It's not very often that one of our editors comes up with an entirely new term used in connection with the metalworking industry, because they have ample opportunity to talk shop with the men of industry and are familiar with their brand of Americanese. However, the other day one of the boys uncovered a dandy. It happened at a technical meeting, and the speaker mentioned in passing something about the "squawk level". After asking a couple of industry engineers and discovering they, too, were mystified, he cornered the speaker who explained it had nothing to do with feedback in loud speakers or screams of hot steel rolling at high speed through a cut-off saw. "That", he says, "is the point in our quality control system which, when we get below it, the finishing mills begin to squawk like hell about the defects in the billets".

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Editorial Contents—Page 67

FIRST . . . wherever production records are kept!

HERE'S WHY 4 COMPANIES PREFER WARNER & SWASEYS

The final test of any machine tool is its ability to turn out more good production in less time. Here are four cases, among many, where carefully kept production figures prove beyond any doubt that Warner & Swasey turret lathes are more profitable.

Far from being isolated instances, these reports are typical of almost every plant that has kept accurate cost records. Why not ask your Warner & Swasey field engineer to help plan your next machine tool expansion for greater productivity . . . and more profit per machine. Write Warner & Swasey, Cleveland, Ohio.

You Can Machine It Better, Faster, for Less . . . with a Warner & Swasey

Company A

using Warner & Swaseys, turns out 12 shell caps per machine per shift. On another make of machine, same capacity, tooled exactly the same, only 8 shell caps could be made . . . a 50% increase for the Warner & Swaseys.

Company B

kept records carefully for 8 years; proved it could machine a 12" gate valve on a Warner & Swasey at a cost lower than that for turning a 6" valve on another make of turret lathe of same capacity.

Company C

machines magnesium wheels. On Warner & Swaseys, cutting at 2300 feet per minute, it has reduced time per piece from 45 minutes to 7 minutes . . . a time saving of 85%.

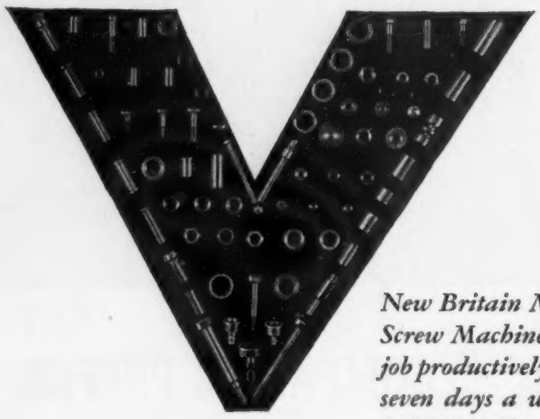
Company D

with accurate production records on every machine tool in its plant, reports that "the difference in profit between Warner & Swaseys and_____(a similar machine) is so great that it is almost unbelievable."

WARNER & SWASEY Cleveland

TURRET LATHES, SADDLE AND RAM TYPES—CHUCKING AND BAR TOOLS—PRECISION TAPPING AND THREADING MACHINES

JACK & HEINTZ SPEEDS
PRECISION PRODUCTION AUTOMATICALLY

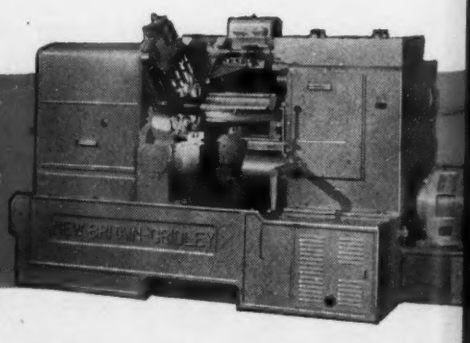


New Britain Multiple Spindle Screw Machines remain on the job productively 24 hours a day, seven days a week at the Jack & Heintz plants at Cleveland ... producing millions of essential aircraft parts illustrated.

Tough engineering and manufacturing headaches are quickly cleared up daily at Jack & Heintz . . . where speed, precision and production are paramount. Here American ingenuity is built into aircraft engine starters, generators, motors, gyro pilots, magnetos and instruments ... all vital war equipment for one purpose . . . Victory.

To meet rigid war production schedules, Jack & Heintz installed a battery of dependable New Britains to produce accurate machined parts in unheard of quantities... parts requiring complex cuts and fine finishes . . . machines to retain original accuracy and operate efficiently with minimum downtime. These same methods will prove equally effective in solving technical problems confronting Industry in attaining postwar objectives. Keep in touch with the New Britain Sales-Engineer near you . . . he has the automatic answer to your manufacturing problems.

NEW BRITAIN



THE NEW BRITAIN MACHINE COMPANY • NEW BRITAIN, CONN.

NEW BRITAIN-GRIDLEY MACHINE DIVISION

M-01011-A

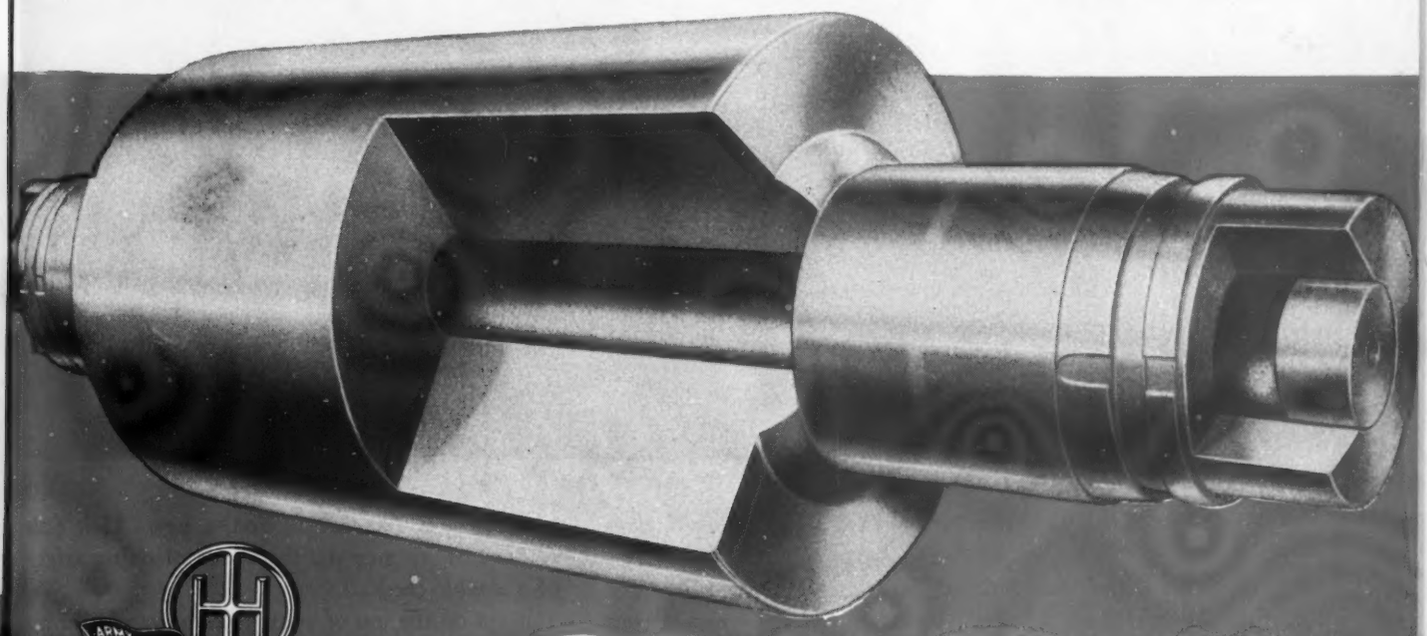
"It's Steel!"

The strength, endurance, and dependability of steel are so well known that even kids like Billie say, *"It's steel!"* with pride.

Whether it's Billie's bike, mother's steel-sash windows, or father's car—or in any of the thousands of steel-made products of tomorrow—steel will benefit by the great respect that it has won.

But the buying public is impatient. Our industry must produce its products quickly for the peacetime markets that are waiting.

Since rolls are so important to the steel mill, Chio is setting its sights on a roll production program that will keep pace with your demands. Our plants are ready —our engineering staff is ready. When you get the "Go!" sign, pass it on to us. We will be ready to produce rolls *right* in the shortest possible time.



ARMY E NAVY

lect from any of these 9 types of Ohio Steel
d Iron Rolls: Carbon Steel Rolls • Ohioloy
ls • Ohioloy "K" Rolls • HOLL-O-CAST Rolls
lled Iron Rolls • Dense Iron Rolls • Nickel
n Rolls • Hi-nickel Grain Rolls • Flintoff Rolls

Free Enterprise is the Only Way to Constantly Higher American Living Standards

Ohio Rolls

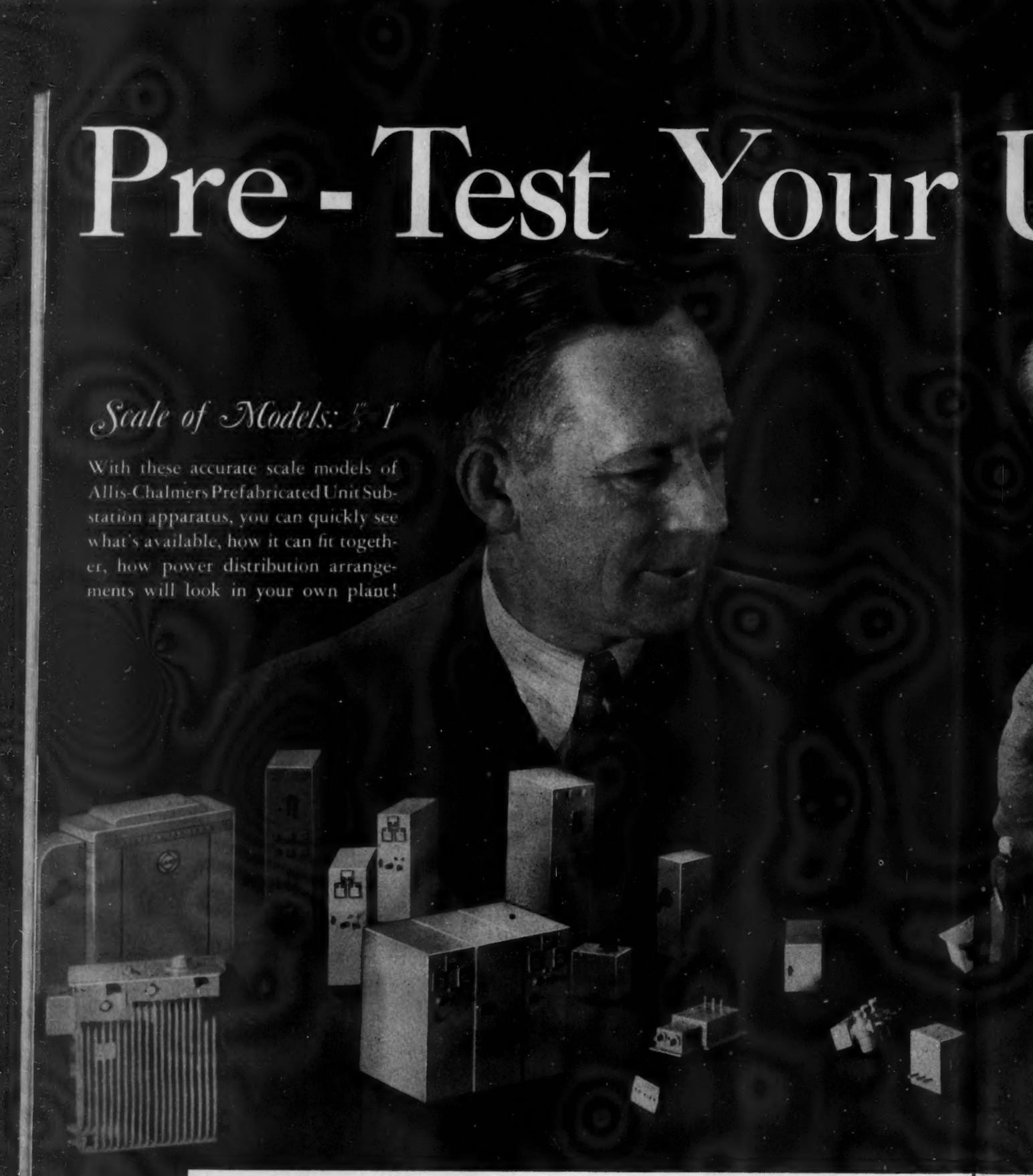
THE OHIO STEEL FOUNDRY COMPANY

LIMA, OHIO • PLANTS: LIMA AND SPRINGFIELD, OHIO

Pre-Test Your U

Scale of Models: ½" = 1'

With these accurate scale models of Allis-Chalmers Prefabricated Unit Substation apparatus, you can quickly see what's available, how it can fit together, how power distribution arrangements will look in your own plant!



IT'S SO SIMPLE, so practical, so fast—*visual planning* of substations with Allis-Chalmers' new "Unit Sub Builder" Set!

And it's good insurance — you *pre-test* your ideas — *see* just what you're getting in terms of dimensions, characteristics, appearance.

Here are the elements Allis-Chalmers Prefabricated Unit Substations are made of — in accurate scale models — plus a new "Unit Sub Slide Rule" to simplify breaker calculation, a new "Unit Sub Check List" to give you the added planning safety of a *double* check.

Right on the top of your desk you can build up all possible solutions to your power distribution problems — compare them from every point of view. For the ultimate in visualization, you can have a floor plan of your factory drawn to the same scale as the models — ½ inch to 1 foot —

Unit Sub Ideas

-You Can with Allis-Chalmers' New "Unit Sub Builder"!

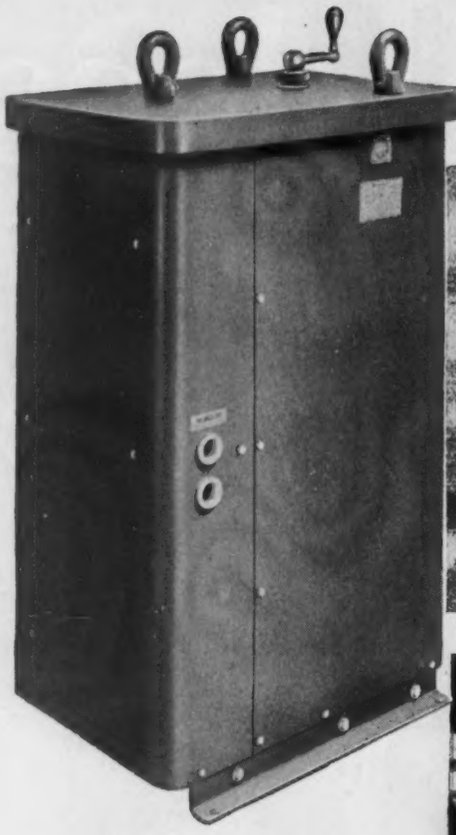
and build up your unit sub *right where it will stand!*

This new service is yours with *no obligation.* Call your nearby Allis-Chalmers district office for a demonstration of the new "Unit Sub Builder", by an Allis-Chalmers field engineer. ALLIS-CHALMERS MFG. CO., MILWAUKEE 1, WISCONSIN.

• • • A 1747

♪ *Tune in the Boston "Pops", Blue Network, every Sat. Eve.*

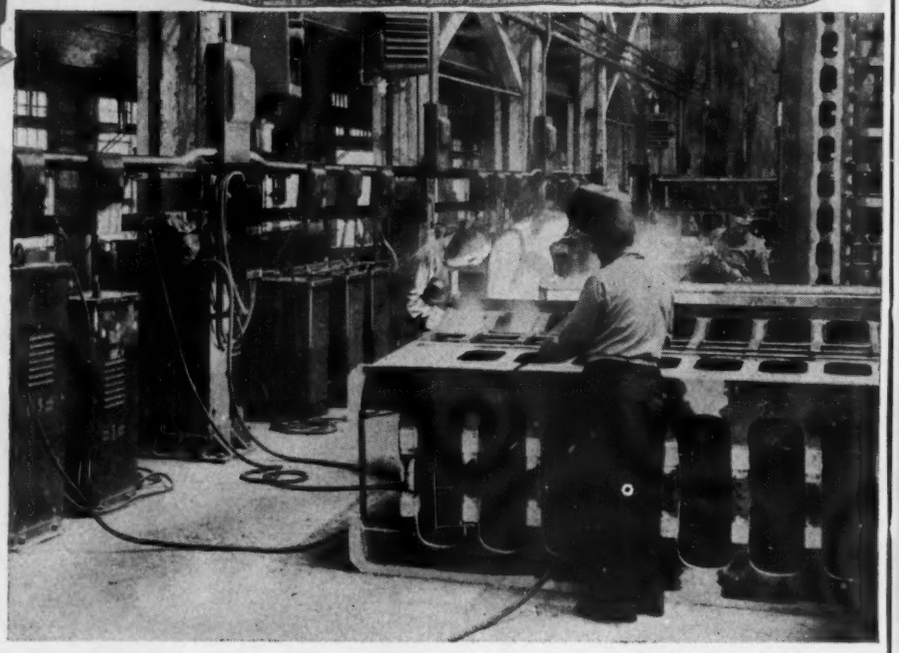
Work Out Your Ideas with
ALLIS-CHALMERS
"Unit Sub Builder" Set!



NEW 400 AMP. A-C WELDER

WITH WESTINGHOUSE DH ELECTRODES

the right combination for flat and horizontal fillet welds of highest quality



ONLY WESTINGHOUSE OFFERS ALL THESE FEATURES

Natural ventilation—No fan or blower required.

Uniform calibration of current scale—Uniform throughout full range of welder rating with stepless adjustment.

Built-in capacitor—Improves power factor and reduces kva input.

Concentric coil construction—Provides simplicity of construction and assures minimum maintenance.

Heavy construction—Outdoor enclosure on all models.

This new 400-ampere machine is the latest addition to the already famous Westinghouse line of a-c welders. It has been especially designed to meet the requirements of heavy-duty manual welding of all kinds.

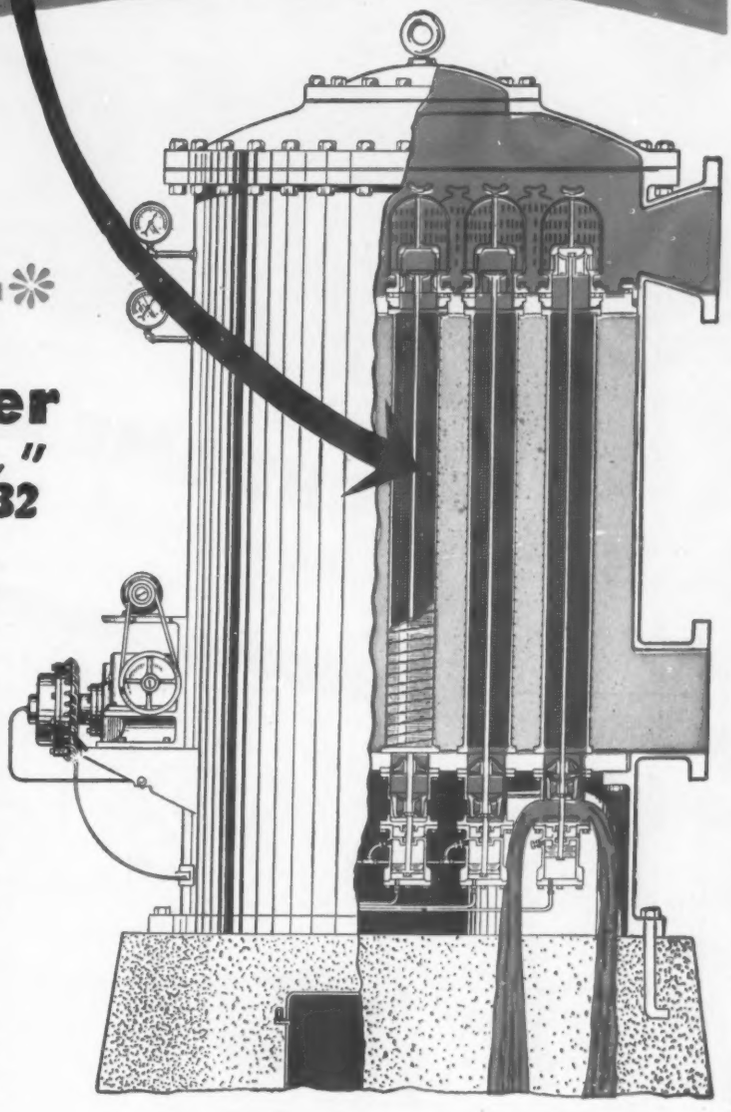
You'll find the new 400 the most economical machine available for the type of work where large diameter electrodes and high welding currents are needed. Jobs will be speeded up, too, because this new machine provides stepless current adjustment over the complete range of 80 to 500 amperes without changing electrical connections, moving coils or flexing current-carrying parts. Welding current is controlled by simply turning a handle.

Another feature you'll like about this new machine is its heavy construction and all-weather outdoor enclosure. You can use it anywhere. For complete details about the new Westinghouse 400-ampere welder, write for Bulletin B-3548. Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa. J-70459

Westinghouse

A-C WELDERS

ADAMS AUTOMATIC WATER FILTERS



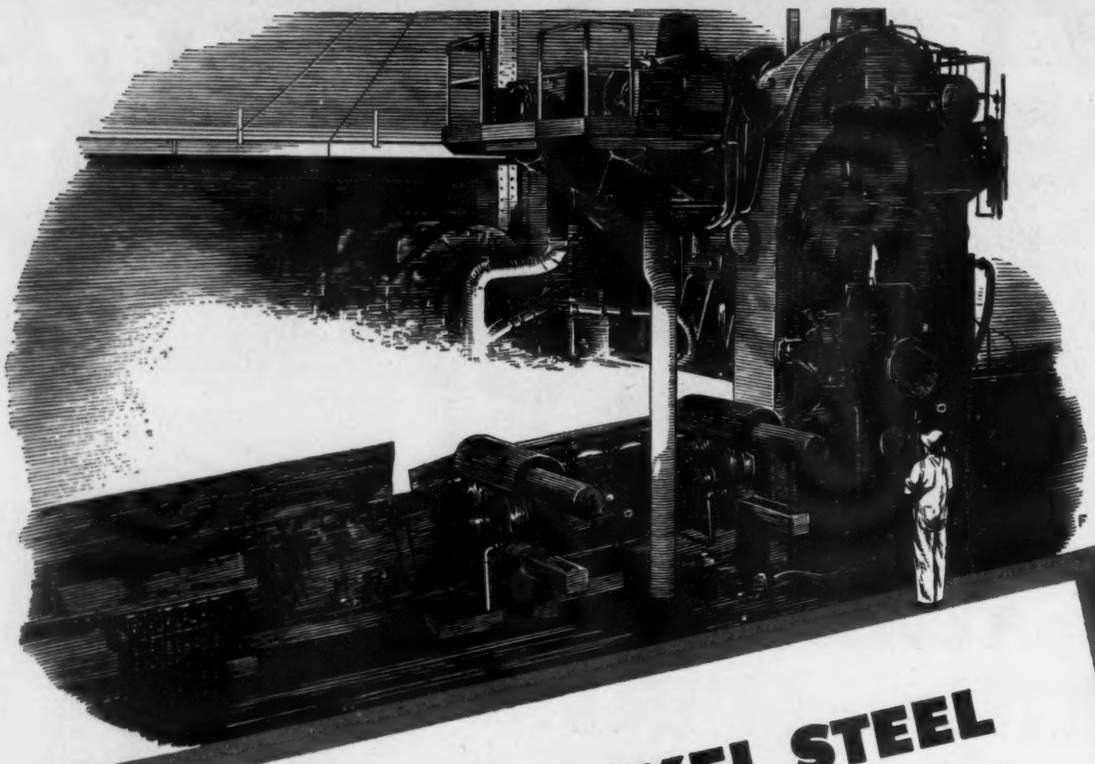
Remove
GRIT and DIRT*
from River Water
*15 times finer than 1/32"

Adams *Poro-Screen* Filters offer a practical answer to large-scale filtration of dirty river water for use in hydraulic equipment. Designed for continuous, automatic operation and requiring a minimum of attention, Adams Automatic Filters supply the required volume of clean water for your operations—water free of dirt and grit which damage bearings, rolls, valves and other equipment. Highly successful on water cooling installations of open-hearth and heat-treating furnaces.

Adams Automatic Filters provide low velocity filtration. Their multiple tube design has no moving clearances, is fully automatic. One tube is back washed at a time while filter is delivering full rated capacity. Adjustable control gives flexibility of back-washing—excessively dirty water more frequently, normal water less frequently. Built in four sizes from 300 gpm. to 2000 gpm. Write for Bulletin 901.

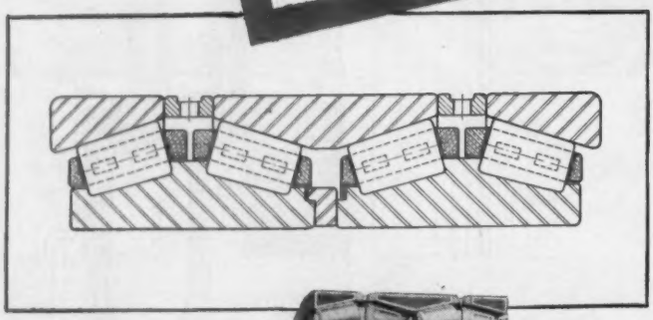
★ R. P. ADAMS COMPANY, INC. ★
75 CHICAGO STREET, BUFFALO, N. Y.

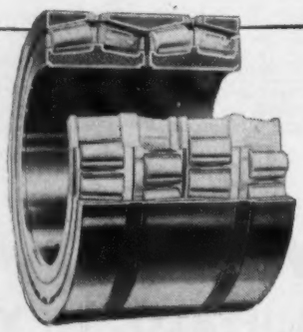
ADAMS PORO-STONE AND PORO SCREEN **FILTERS**



CHROME NICKEL STEEL

FOR ALL-OUT ROLL NECK BEARING PERFORMANCE





Cross section and cutaway view of the 21.500" O. D. 4-row tapered roller bearing used on the working rolls of a 3-high mill. Radial capacity at 100 r.p.m. is 550,000 pounds; thrust capacity 168,000 pounds.

Helping rolling mills achieve peak tonnages is the year-round job of Torrington four-row tapered roller bearings on roll necks. Built of S.A.E.-E3310 steel (with higher nickel content) for maximum tonnage and service life, these sturdy Torrington Bearings efficiently minimize friction . . . handle maximum loads with minimum maintenance requirements . . . are easily lubricated and serviced.

That's typical Torrington Bearing performance. And it's why you find Torrington Bearings of many types and sizes widely used in the steel industry . . . on back-up rolls and work-rolls . . . screw downs, vertical edger rolls, table rolls, sheet levelers and shears . . . in drives and pinion stands . . . on many other machines where they carry heavy loads at low maintenance cost.

The engineers of Torrington's Bantam Bearings Division specialize in meeting heavy-duty, high-speed, anti-friction requirements, routine or unusual. Their advice and cooperation is at your disposal.

THE TORRINGTON COMPANY - BANTAM BEARINGS DIVISION
SOUTH BEND 21, INDIANA

TORRINGTON BEARINGS

STRAIGHT ROLLER • TAPERED ROLLER • NEEDLE • BALL

Pennsalt EC-10 does a quick, thorough job

Oils, greases, metal chips and shop dirt are quickly removed from steel bomb fuse plugs in the precleaning process with Pennsalt EC-10. Pennsalt K-7 is used in the subsequent Anodic Cleaning process.

This combination makes it possible for each eight hour shift to produce an average of 9700 fuse plugs with only 1/10 of 1% rejects — a step up in production of 15%.

The following is the actual case history of this operation.

FUSE PLUGS
(BOMB)

PENNSALT EC-10 AND PENNSALT K-7 CLEANING PRIOR TO ZINC PLATING AND IRIDITE DIP

PROBLEM To clean steel bomb fuse plugs free of oils, greases and filings prior to zinc plating and subsequent "Iridite" dip coating.

EQUIPMENT USED A 200 gal. solvent dip tank followed by a spray rinse and a 325 gal. reverse current alkali cleaning tank followed by a dip rinse tank.

METHOD

PART 1 — PRECLEANING

1. Use Pennsalt EC-10 concentrated, room temperature; soak for 30 seconds.
2. Cold water spray rinse.

PART 2 — ANODIC CLEANING

3. Use Pennsalt K-7 at 50 to 100 amps./sq. ft. at 8 oz./gal., 200° F. for 30 seconds.
4. Hot water rinse.
5. Muriatic acid dip.
6. Cold water rinse.
7. Zinc Electroplate.
8. Hot water rinse.
9. Hot "Iridite" dip and then dry air.

Special Chemicals Division Products

Acid-, Alkali-, and Solvent-proof Cements • Lead Fluoborate Concentrates • Fluoboric Acid • Acid, Alkali and Solvent Emulsion Type Cleaners • Paint Strippers • Pickling Agents.

"THE PENN SALT MAN"
FIRST A TECHNICIAN . . . THEN A SALESMAN

Penn Salt's Special Chemicals Division men are well trained in the application of chemicals to industry's problems. If you have a metal cleaning problem, don't hesitate to seek the advice of "THE PENN SALT MAN." He will advise you without obligation.

SPECIAL CHEMICALS DIVISION

PENNSYLVANIA SALT MANUFACTURING COMPANY
Chemicals

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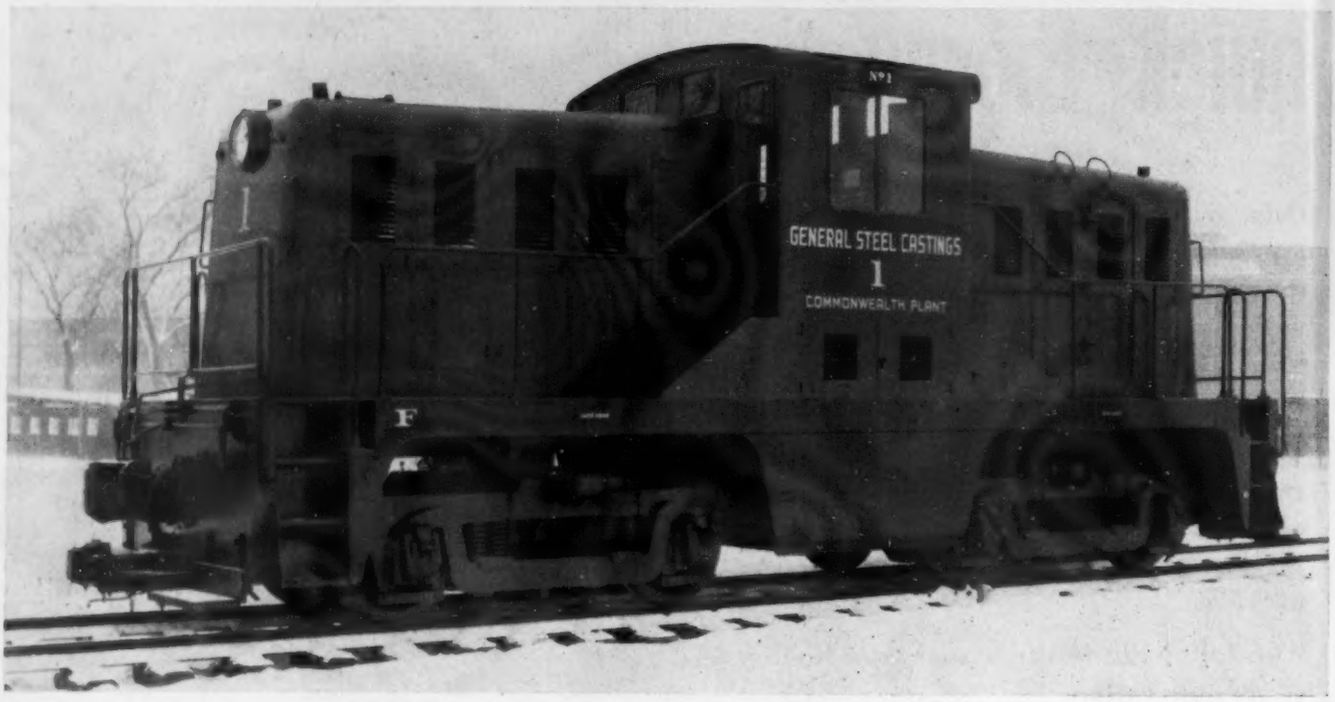
NEW YORK • CHICAGO • ST. LOUIS • PITTSBURGH • CINCINNATI • MINNEAPOLIS • WYANDOTTE • TACOMA

HEAVY SCHEDULES



Require Dependable Motive Power

BLW
THE BALDWIN GROUP

Whitcomb Locomotives are receiving high praise on those heavy difficult operations where the tonnage must be kept rolling. They are designed to handle your haulage at low cost per ton, year in and year out with the minimum of operating expense. May we help you with your locomotive investment?

For Power Availability Economical Operation

ORDER WHITCOMB SWITCHERS

THE WHITCOMB LOCOMOTIVE CO.

ROCHELLE, ILLINOIS

SUBSIDIARY OF THE BALDWIN LOCOMOTIVE WORKS

Straightening Machines

at

KAISER Co., Inc. and other plants throughout the U.S.A.

No. 2B 24-Roll Combination Horizontal & Vertical Straightener

No. 3AH 9-roll Horizontal Straightener

MANUFACTURERS OF:

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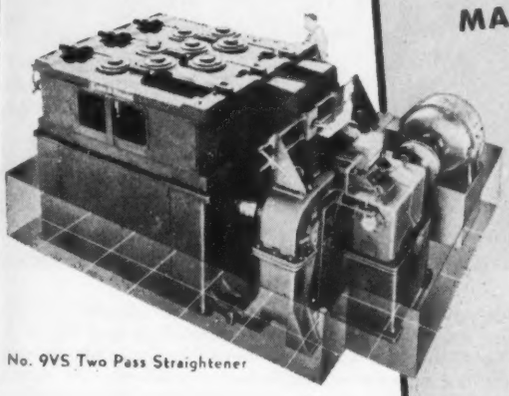
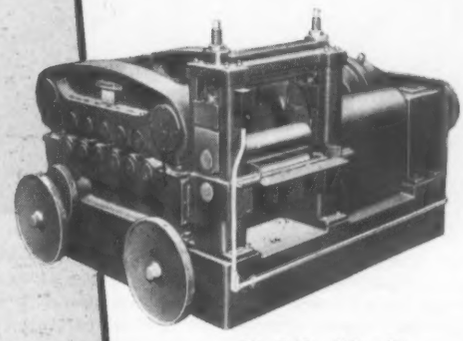
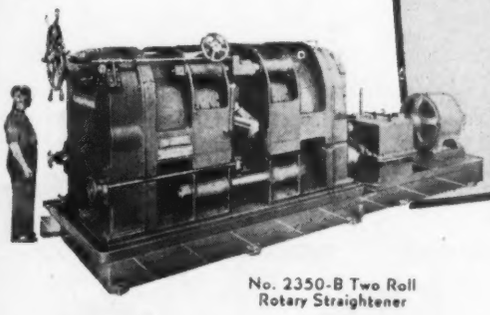


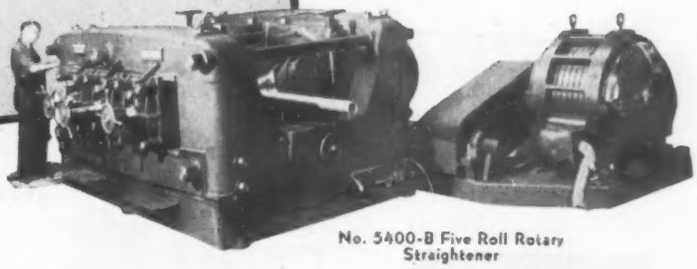
No. 9VS Two Pass Straightener



No. 7 13-roll Leveller



No. 2350-B Two Roll Rotary Straightener



No. 5400-B Five Roll Rotary Straightener

KANE & ROACH

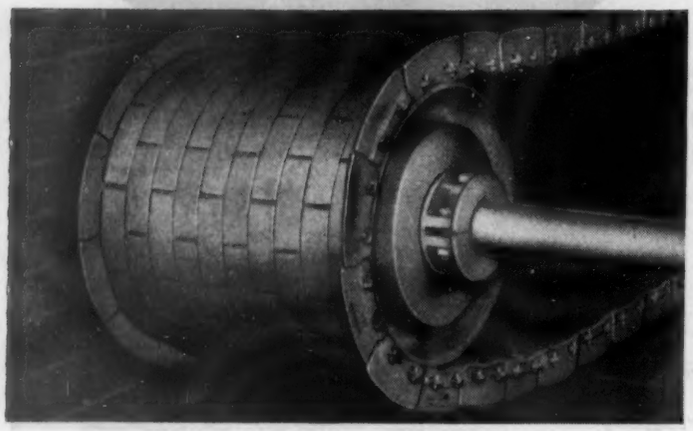
INCORPORATED

Syracuse, New York

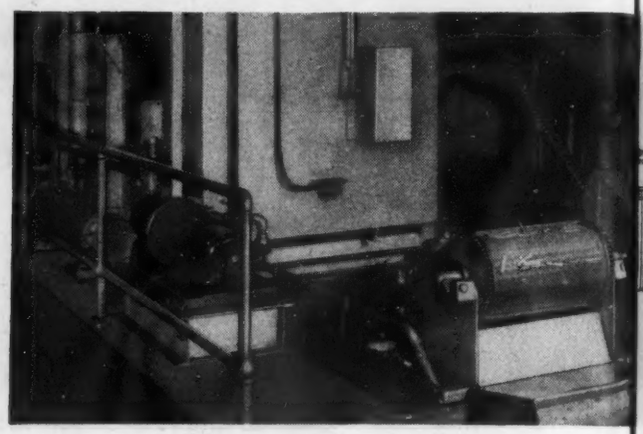
Established 1887

How to
HARDEN STEEL PARTS
in a CONTINUOUS FLOW
for INCREASED PRODUCTION

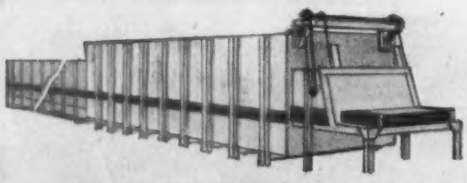
The G-E belt conveyor electric furnace is specially designed for continuous scale-free hardening of bolts, nuts, springs, machine parts, tools, or other small steel products. Representing a typical application, the furnace above is used for hardening a continuous flow of machine-gun links in a protective atmosphere.



The conveyor belt is entirely enclosed in the heating chamber to permit a non-decarburizing atmosphere to be maintained at all times. By adjusting the speed at which the conveyor carries charges through temperature-controlled, multiple heating zones, the time-temperature cycle for any steel-hardening requirement can be maintained.

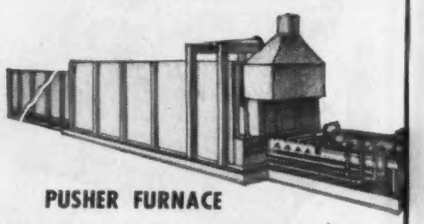


After being uniformly heated, the charge is dropped through a sealed chute, into an oil-quench tank. In a typical installation, a high-velocity flow of quenching medium quickly cools the hot material as it falls from the furnace. A second conveyor within the quench tank automatically discharges the hardened parts from the quench.

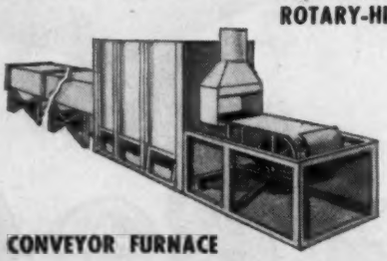


ROLLER-HEARTH FURNACE

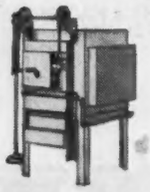
ROTARY-HEARTH FURNACE



PUSHER FURNACE



CONVEYOR FURNACE



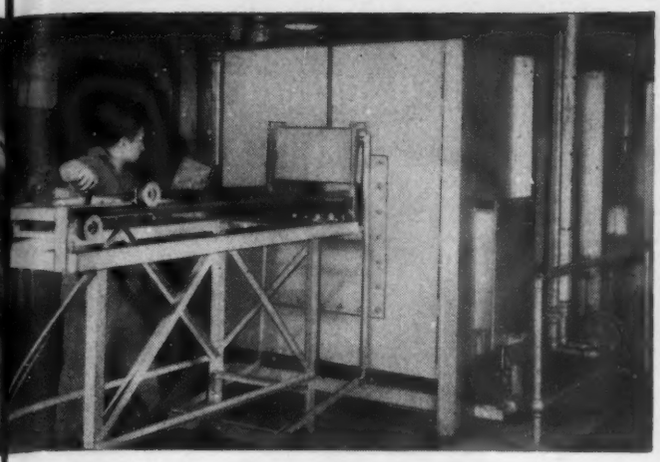
BOX FURNACE

PIT FURNACE

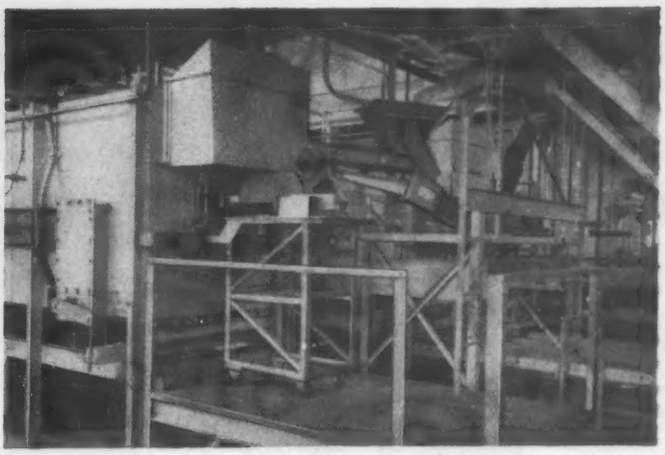
GE ELECTRIC FURNACES

FOR PRACTICALLY EVERY INDUSTRIAL NEED

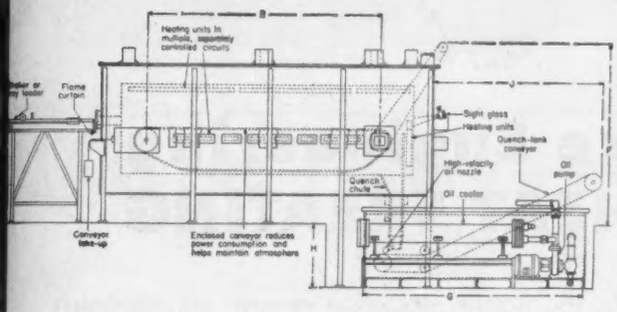
BACKED BY A NATIONWIDE ENGINEERING SERVICE



Depending upon the type of product to be hardened, one of two types of loaders may be employed. Designed for general use, the tray loader is specifically recommended for loading certain types of parts. It is manually operated and assures accurate spacing of charges placed upon the conveyor belt.

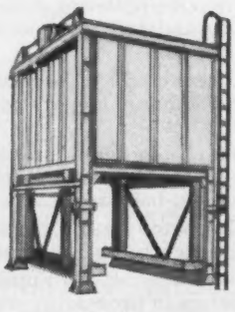


The automatic motor-operated shaker loader is designed to handle large quantities of small parts, such as bolts, nuts, and springs. When parts to be hardened are fed into the shaker loader in a constant volume, the device automatically loads the furnace conveyor at a similar rate.

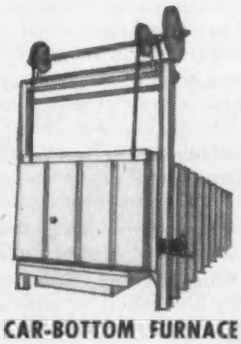


In this schematic diagram of a typical G-E belt-conveyor electric furnace, note that the entire heat-treating operation is automatic—from the time of loading until the hardened parts are discharged from the quenching medium. If the uniform hardening of numerous small steel parts, *at low cost* is of interest to you—

—get in touch with one of our many industrial-heating specialists, who are in most of the principal cities. He will be glad to study your requirements and to suggest the most efficient means of meeting them. His recommendations are based upon years of practical experience. For details—



ELEVATOR FURNACE



CAR-BOTTOM FURNACE

- - - contact the nearest G-E office, or mail the coupon below:

General Electric Company, Sec. 675–114
Schenectady 5, N. Y.

—Please send me your bulletin, "Belt-conveyor Electric Furnaces," GEA-2790A.

—Please send me your bulletin that describes the following other types of furnaces:.....

—Please have a G-E heating specialist call at the earliest opportunity.

NAME.....

COMPANY.....

ADDRESS.....

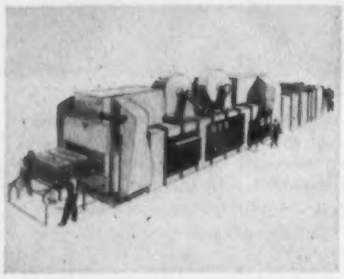
CITY.....STATE.....

Buy all the BONDS you can—*and keep all you buy*

GENERAL ELECTRIC

Behind the Success of Aluminum and Magnesium Alloys...

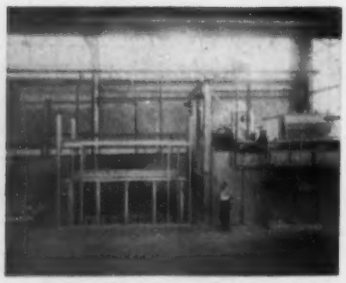
Is Despatch Furnace Engineering for PRODUCTION HEAT TREATING



Automatically Heat Treats and Quenches Aluminum Sheets

Requiring no human effort except for loading, this Despatch furnace automatically transports, heat treats and quenches hundreds of dural sheets hourly.

100% time-cycle controlled. Electrically heated.



Heat Treats and Quenches 8000 lbs. at a Time

After accurate processing of each 4-ton load in its 15-ft. chamber, charge is withdrawn from this Despatch furnace, elevator-dropped into quench. Waiting load immediately is drawn into chamber. Indirect gas-fired heater.

Battery of Despatch Furnaces Ages Castings

Typical Despatch rack-loaded furnaces (direct-fired recirculating heat) for aging aluminum castings.

Other furnaces are available for preheating billets and sheets, for annealing and other heat treating processes. Details sent on request.

In the urgent, desperate race to get *maximum* benefits from non-ferrous alloys for war, few heat treating developments have been so extensively used by industry as those *pioneered* by Despatch.

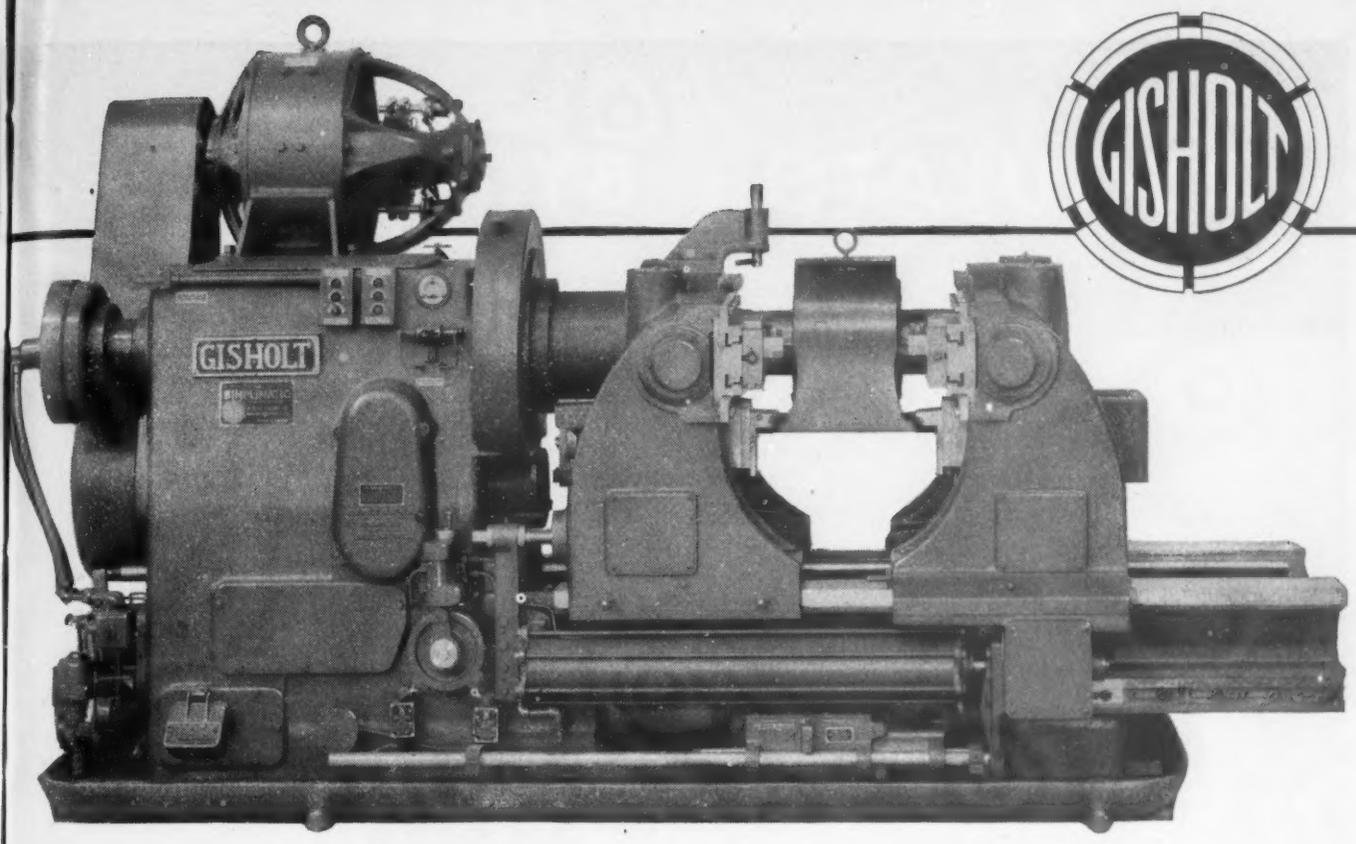
Typical Despatch Engineering "First's"

As a result, aluminum and magnesium fabricators from coast to coast use Despatch-engineered heat treating furnaces daily. Over 300 such units have been installed, and their production records confirm the value of these Despatch developments:

- **Uniform heatflow in large chambers.** A Despatch high-volume-airflow heat distributing and circulating system that guarantees heat uniformity and accurate control regardless of length of work chamber.
- **Robot handling and operation.** Perfected by Despatch, this development eliminates all manual operations (except loading). Note picture at left.
- **Indirect gas heating.** As Despatch-pioneered, this allows use of gas as well as electricity for heating. Assures clean, non-contaminated air heating; helps reduce costs.
- **Fast quench of big loads.** This Despatch feature permits transfer of *tons* of castings to quench baths in *seconds*.
- **Tight-sealed construction.** This is successfully applied by Despatch for greater efficiency in processing with protective atmospheres.

CALL A DESPATCH ENGINEER to recommend the right furnace for your needs. Types and sizes for all requirements.

DESPATCH OVEN COMPANY MINNEAPOLIS 14 MINNESOTA, U.S.A.



GISHOLT

Motor frames machined – both ends – three minutes – *OR LESS*

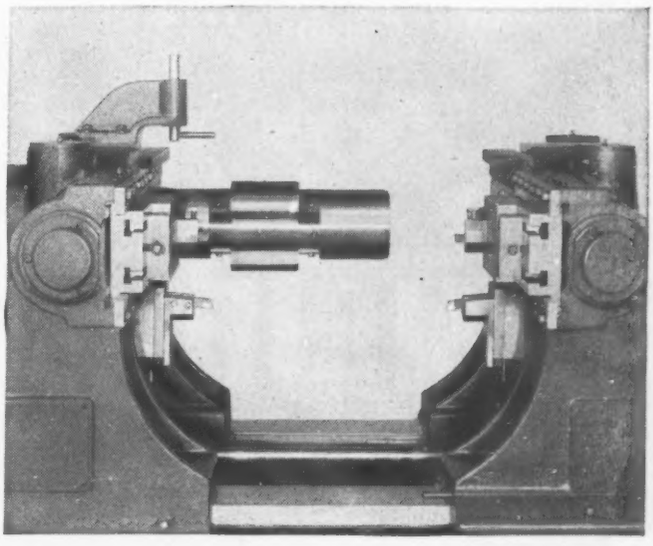
Here's another example of the way this versatile automatic lathe can be adapted to handle an extremely wide range of work.

THE GISHOLT SIMPLIMATIC

Equipped with two special vertical carriages, this Gisholt Simplimatic is set up to machine both ends of these motor frames at once.

Finish facing and boring operations are made possible at both ends simultaneously by the flexible arrangement of front and rear slides. Work is carried on an expanding arbor with pilot. Allowing two minutes for loading and unloading, the longest floor to floor time on any of three different sizes of frames is three minutes. Actual machining time is one minute or less.

If you produce standard parts in sufficient volume to consider the economy of automatic machining, look into the Gisholt Simplimatic. It is available in both Platen and Radial types. Write for full information.



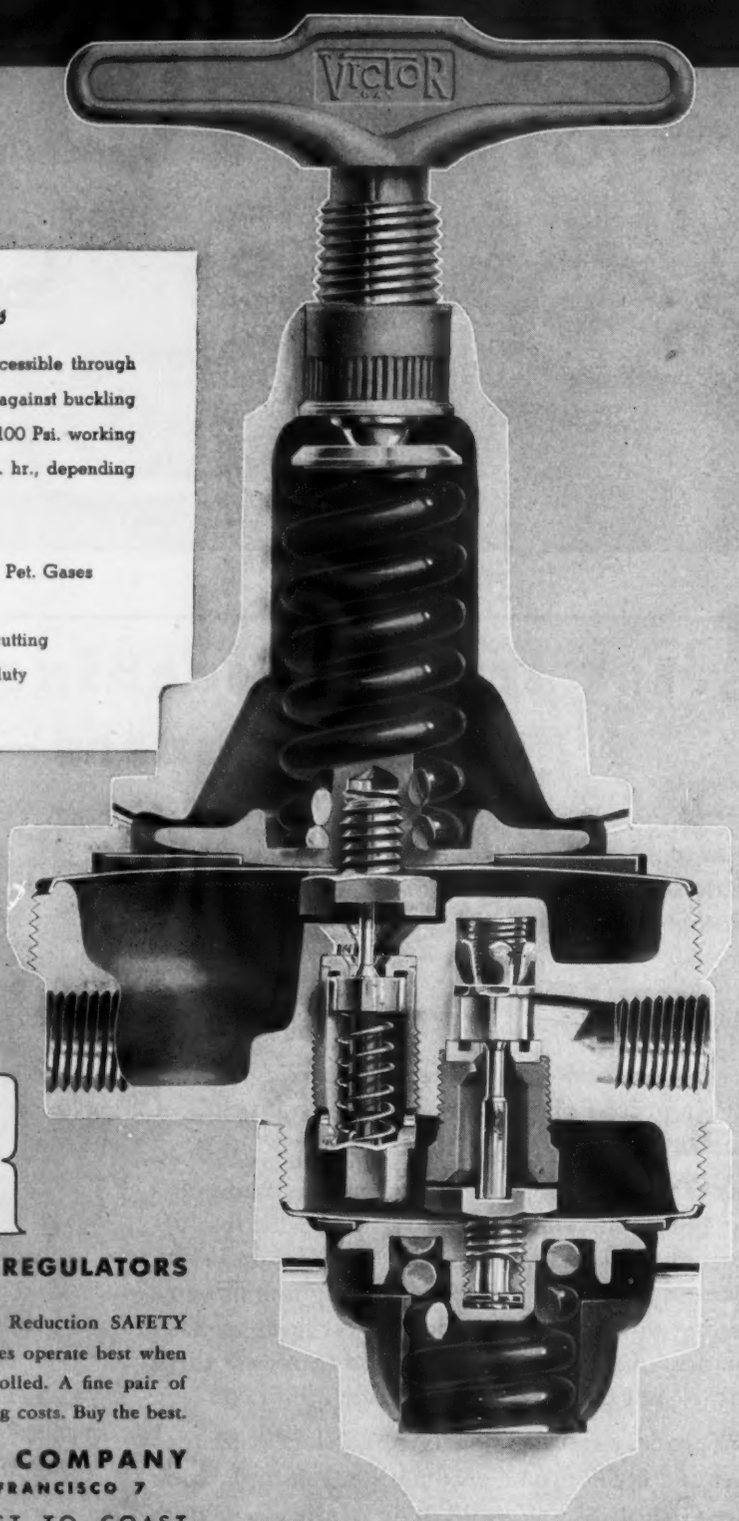
This tool arrangement permits still another pair of slides to be mounted at the rear of the vertical carriages. Front slides can then be used for rough facing and rough boring with a shaving cut, rear slides for finish facing, and lower slides (feeding longitudinally) for finish boring.

GISHOLT MACHINE COMPANY
1217 E. Washington Ave. • Madison 3, Wisconsin

Look Ahead . . . Keep Ahead . . .
With Gisholt Improvements in Metal Turning

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES

REGULATOR BY VICTOR



Specifications

Two-Stage Reduction. Both seats accessible through rear housing. Diaphragms protected against buckling or shearing. Hourly gas capacity at 100 Psi. working pressure from 1500 to 3000 cu. ft. p. hr., depending upon outlet bushing.

Model VTS-40, Oxygen
Model VTS-41, Acetylene or Liq. Pet. Gases
Model VTS-42, Hydrogen
Model VTS-43, Oxygen, heavy cutting
Model VTS-44, Oxygen, heavy duty

VICTOR

ARMY E NAVY

SAFETY REGULATORS

This is the famous VICTOR Two-Stage Reduction SAFETY Regulator, Model VTS-40. Welding torches operate best when the gases they utilize are accurately controlled. A fine pair of regulators can do much to reduce operating costs. Buy the best.

VICTOR EQUIPMENT COMPANY
844 FOLSOM STREET • SAN FRANCISCO 7
DISTRIBUTORS FROM COAST TO COAST

AD 77

...This ARM could have been saved with a *Trabon* LUBRICATING SYSTEM

● These accidents, their heartaches and compensation costs can be avoided.

Trabon Lubrication eliminates the risk of having a man crawl around the machine lubricating each bearing individually,—minimizes accidents, breakdowns, repairs and lost production.

Service-proved for years on ore bridges, blast furnace tops and other costly steel mill equipment, cranes, crushers, shears, presses, dredges and other machines and machinery of all kinds, Trabon Lubrication makes certain that every bearing whether large or small, easy or difficult to reach receives just the desired amount of lubricant, at just the desired frequency, automatically, while the machine is in operation.

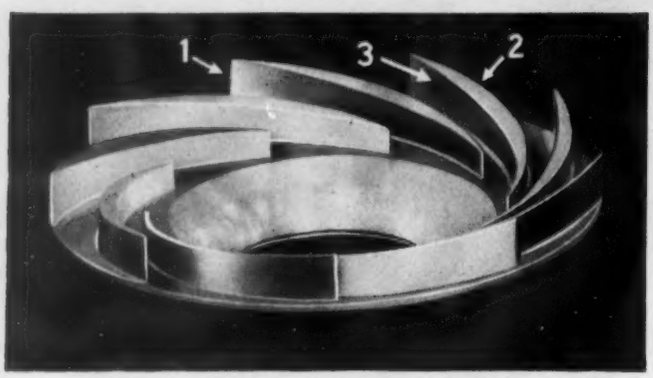
Let Trabon engineers with their long and successful experience in this work, show you how a Trabon Lubricating System, individually engineered to the requirements of your own particular and individual job, will help you increase production and cut your costs. Fully descriptive engineering bulletin sent on request. Simply tell us what kind of machine you wish to lubricate. Trabon Engineering Corporation, 1818 East 40th Street, Cleveland 3, Ohio.

Trabon LUBRICATING SYSTEMS

... for Machines and Machinery of all kinds

ORIGINATORS AND PATENT OWNERS OF THE SINGLE LINE REVERSING LUBRICATING SYSTEM

THREE *Snyder* SPECIALS *for* MILLING DIFFUSER PART



One of the chief objectives in creating these three special milling machines was to reduce to a minimum the need for costly, time-consuming hand finishing operations on an aircraft diffuser part.

First operation uses a vertical, two-spindle, end-milling machine to mill a 1/32" radius on each end of the nine diffuser vanes. End mills are installed on eccentrically mounted quill housings which rotate through nearly 180°. Two-spindle head, motor and drive mechanism slide into position hydraulically, supported by two guide bars. Part is clamped on nine-station Geneva index table. This machine is essentially a Snyder 3 v 14 drilling machine with special equipment.

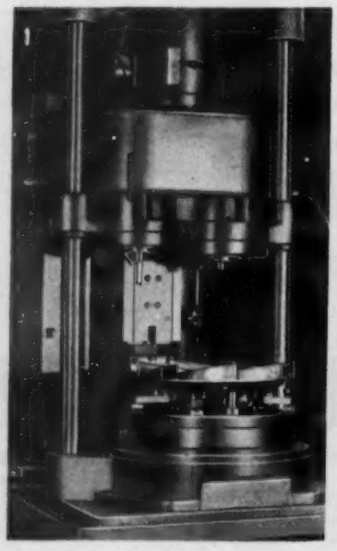
Second operation uses a vertical, single-spindle miller with side milling cutters set on an angle to the vertical center line. Besides feeding the cutter down, moving the entire slide in and out and rotating the table at feed rate, it also is necessary to keep the cutting edge of the milling cutters tangent to the various radii which make the contour of the vanes. Therefore it was necessary to rotate the spindle housing angularly in correspondence to the in-and-out movement of the main slide. This operation is completed in nine passes.

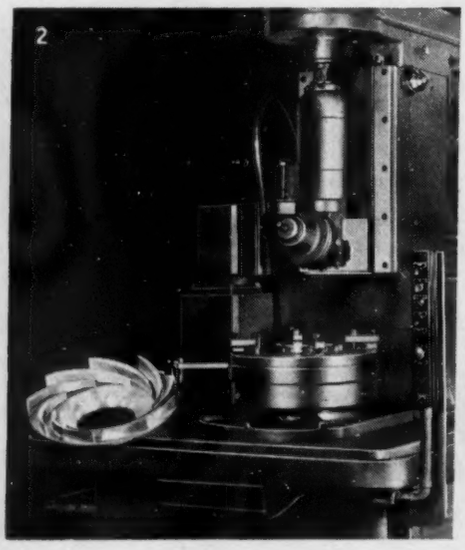
Third operation uses a vertical, single-spindle end mill in which the housing follows the contour of the part by cam action. Part is rotated at feed rate through an arc while the vertically feeding spindle housing is moved in and out through cam action. All three actions of the feed mechanism—feeding cutter up and down, moving in and out and rotating the part—are mechanically synchronized.

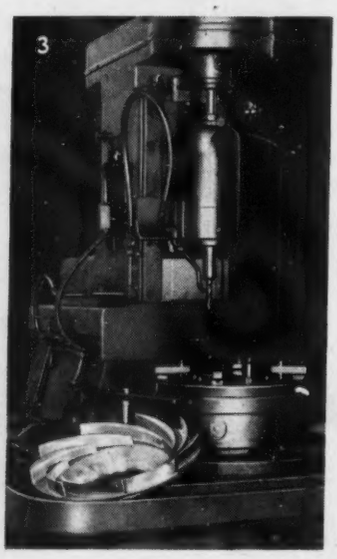
On the basis of time and money saved, these machines are an excellent investment. Perhaps there are opportunities for similar savings in your present or prospective production program. We invite your inquiries. *Snyder Tool & Engineering Company, 3400 E. Lafayette Avenue, Detroit 7, Michigan.*

20 Years of Successful Co-operation with Leading American Industries

SNYDER
DESIGNERS AND BUILDERS OF MACHINERY FOR HIGH PRODUCTION AT LOW UNIT COST







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1910 MAGDOLITE 1945

THE ORIGINAL
DEAD-BURNED DOLOMITE

MAGDOLITE...
5 WAYS BETTER
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√ QUALITY
√ STRENGTH
√ PREPARATION
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"Magdolite stays put" say the men with the shovels!

Inferior refractory means "Time Out"—lost production—less profit. That's why experienced men of steel specify **Baker's Magdolite.**

The chemical, physical and mineralogical composition of **Magdolite** has been constantly improved to increase efficiency and ease the strain on today's overworked furnaces. Correct sizing eases proper distribution.

Two adequately stocked sources of supply . . . Billmeyer, Pa. and Millersville, Ohio . . insure prompt shipment. Consult our service department with your particular problems.

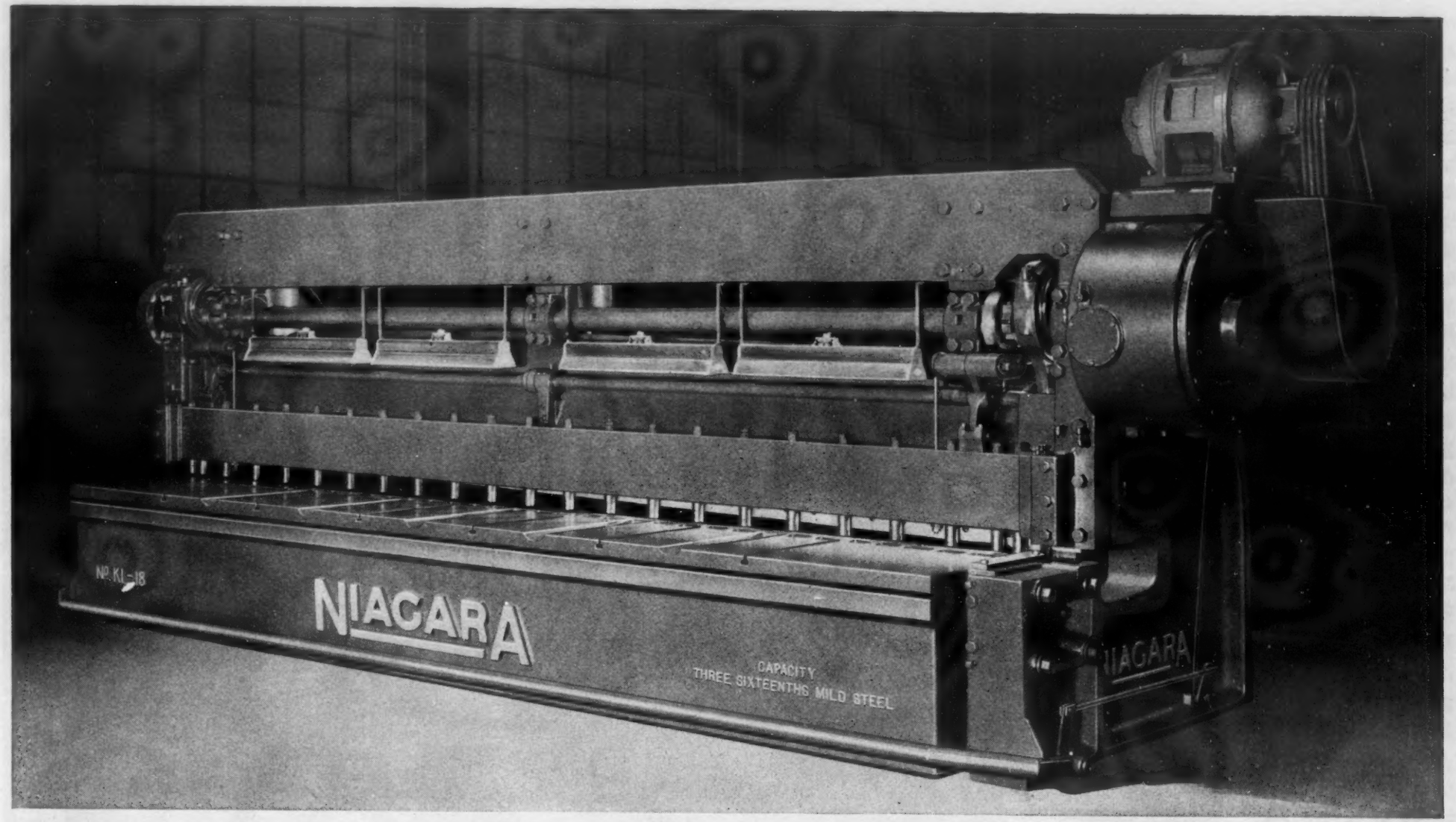
When you order, specify **Baker's Magdolite** . . . it pays!

THE J. E. BAKER COMPANY

YORK, PENNSYLVANIA
BILLMEYER, PA. MILLERSVILLE, OHIO

MAGDOLITE • LOW SILICA LIMESTONE
CHEMICAL LIME • FLUXING LIME

MAGDOLITE • SERVING THE STEEL INDUSTRY FOR 35 YEARS



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Shear knives available for cutting alloy and special steels. Let us know what you desire to cut. Prompt delivery on spare knives for Niagara Squaring Shears. Also factory grinding service by the same skilled men who grind new Niagara knives.

Lansing 18" SLOT FURNACE

Hourly capacity, 3600 pounds. Heating is accomplished by combination oil and gas burners operating in variable ratio, or by either alone. Automatic proportioning control equipment. Removable water cooled heat shield and auxiliary air shield.

LANSING ENGINEERING COMPANY 934-36 CLARK STREET LANSING 6, MICHIGAN

INDUSTRIAL
HEAT TREATING EQUIPMENT
for

HARDENING BRAZING TEMPERING
NATURALIDING STRESS RELIEVING NORMALIZING
CARBURIZING CYANIDING ATMOSPHERE CONTROL

IN the production of this Pratt & Whitney 2,000 h. p. two-stage supercharged aircraft engine*, studs by Ferry Cap perform a very important function. Ferry Shinythreads—America's Leading Aircraft Engine Studs—are used at most critical points throughout the aircraft engine.

In keeping with the high order of excellence of the airplane engine, Shinythreads are of the toughest aircraft quality alloy steel, finished to extremely close thread and body tolerances. They reflect outstanding accuracy, workmanship, and finish.

Ferry Shinythreads—Straight or Step Type—are precision rolled threaded to Class 4 fit, resulting in vastly greater production and 15% to 20% greater strength, due to compression of metal and resultant thread grain flow by our thread rolling process, than by other known methods. Every Shinythread must be an exact duplicate of the master plug by which the thread gauge is set.

FERRY
SHINYTHREADS
Step Type—are skillfully thread-tapered (first 1 to 3 threads) at the stud end to make driving Ferry Studs easier and quicker.

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● The same workmen who make Ferry Shinythread Studs make our fine line of Shinyheads—America's Best Looking Cap Screw—and our other Ferry products. Precision has been a principle with us for the past 38 years. It is your assurance of outstanding accuracy and guarantee of highest quality products.

What is your fastener problem? We'd like to discuss it with you.

*Built only by Nash-Kelvinator Corp. and Pratt & Whitney Aircraft, Division of United Aircraft Corp.

THE FERRY CAP & SET SCREW CO.

2159 SCRANTON ROAD • CLEVELAND 13, OHIO

Pioneers and Recognized Specialists Cold Upset Screw Products since 1907

CAP AND SET SCREWS • CONNECTING ROD BOLTS • MAIN BEARING BOLTS • SPRING BOLTS AND SHACKLE BOLTS • HARDENED AND GROUND BOLTS
SPECIAL ALLOY STEEL SCREWS • VALVE TAPPET ADJUSTING SCREWS • COMMERCIAL AND ALLOY STEEL STUDS • FERRY PATENTED ACORN NUTS

When is a Used Machine Tool a Good Buy?

There are two things you must be sure of before reaching the correct answer to that question.

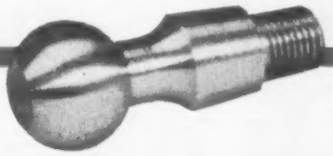
1. Be sure the purchase price of the used machine, plus the cost of putting it in proper condition, will be less than the cost of a new machine of equal performance.
2. Be sure the used machine is a model that will do the work you plan for it—at the degree of precision you require and at costs that will help you meet competition.

Probably there will be hundreds of Acme-Gridley Automatics offered for sale by war plants having no further use for them.

Some of these were tooled as special-purpose machines. Others are general-purpose machines. All of them were up to the highest Acme-Gridley standards of precision and production capacity, model for model, when delivered.

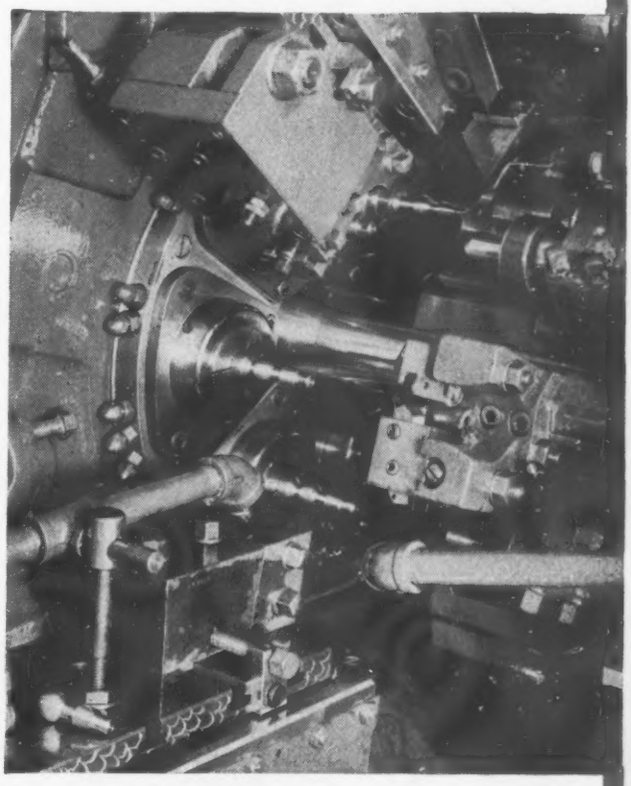
But there are no records to tell which of them might have been overworked or abused, or whether they have had proper care.

We are interested in seeing that new owners get value received when the machines change hands. So we suggest that you consult us before completing arrangements to purchase any used Acme-Gridley Automatic.

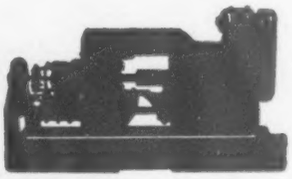


The Modern Way to Cut Production Costs

Here is a 200,000 run job, requiring 9 operations. Tolerances are exacting. Produced on a 1" Model RA-6-Spindle Acme-Gridley Bar Automatic in less than 6 seconds.



ACME-GRIDLEY BAR and CHUCKING AUTOMATICS maintain accuracy at the highest spindle speeds and fastest feeds modern cutting tools can withstand.

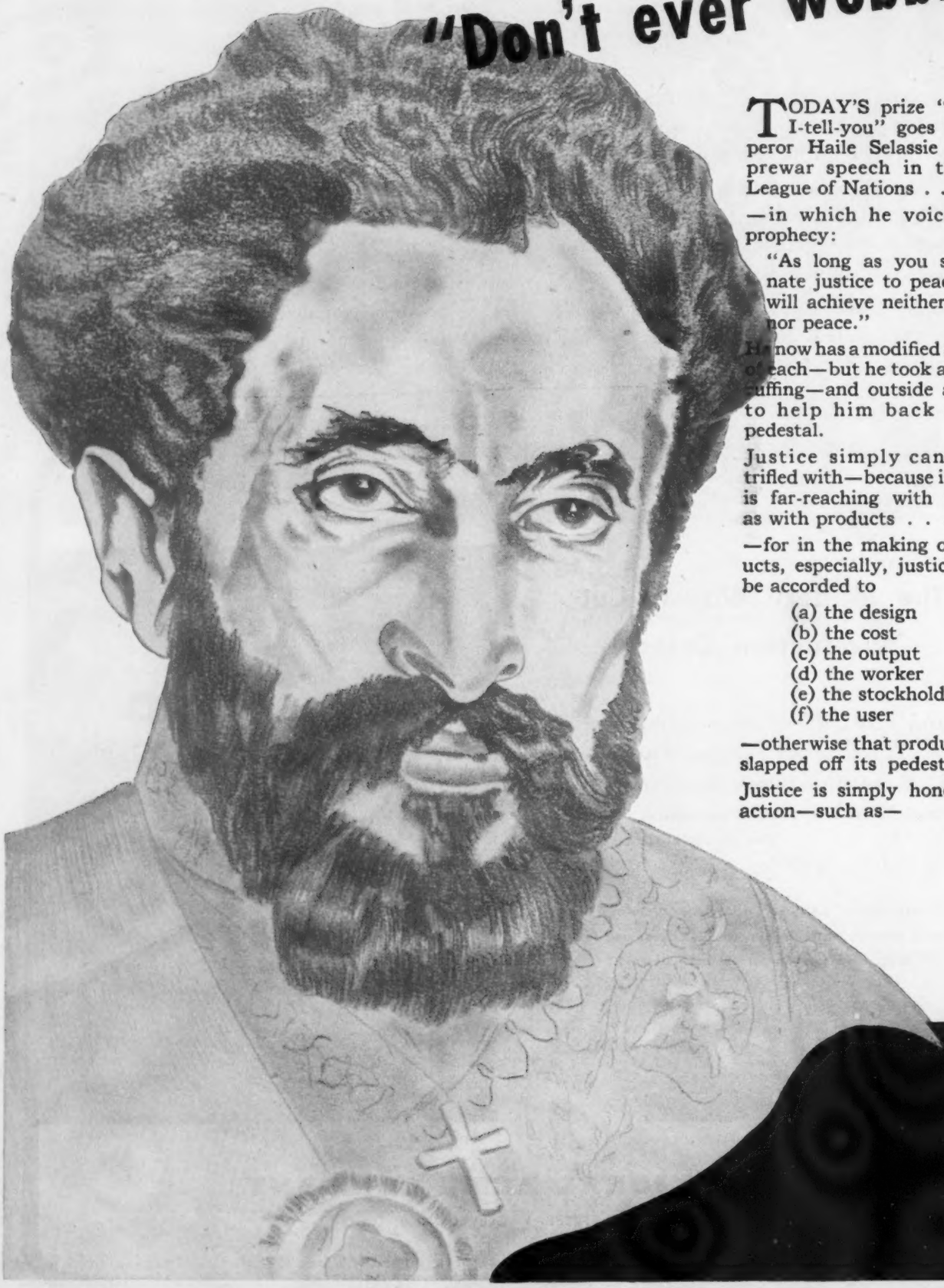


THE NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

then he said to himself

"Don't ever wobble"



TODAY'S prize "Didn't-I-tell-you" goes to Emperor Haile Selassie for his prewar speech in the late League of Nations . . .

—in which he voiced this prophecy:

"As long as you subordinate justice to peace—you will achieve neither justice nor peace."

He now has a modified amount of each—but he took an awful buffing—and outside aid had to help him back on his pedestal.

Justice simply cannot be trifled with—because its effect is far-reaching with peoples as with products . . .

—for in the making of products, especially, justice must be accorded to

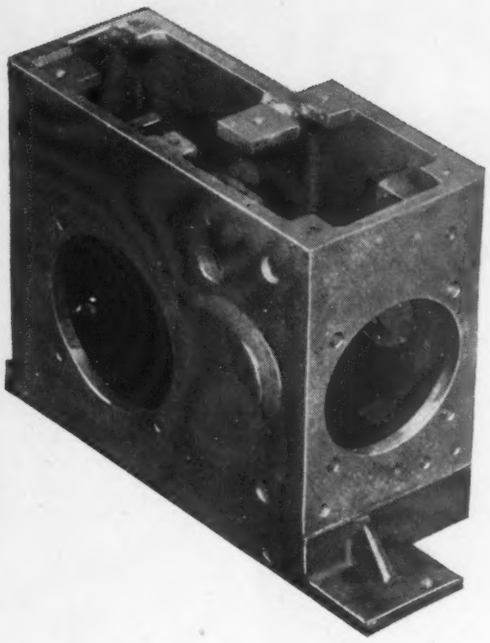
(a) the design
(b) the cost
(c) the output
(d) the worker
(e) the stockholder
(f) the user

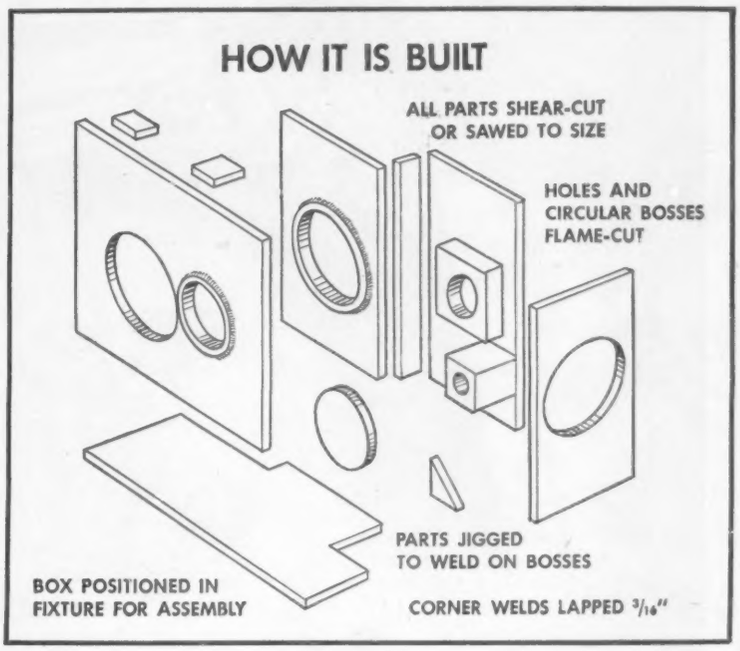
—otherwise that product gets slapped off its pedestal.

Justice is simply honesty in action—such as—

"Straight Thinking Pays"... *he says*

LOOK, EMPEROR, how straight thinking with Arc Welding keeps a product from being slapped off its pedestal:




HOW IT IS BUILT
ALL PARTS SHEAR-CUT OR SAWED TO SIZE
HOLES AND CIRCULAR BOSSES FLAME-CUT
PARTS JIGGED TO WELD ON BOSSES
BOX POSITIONED IN FIXTURE FOR ASSEMBLY
CORNER WELDS LAPPED 3/16"

PRODUCT

Gear case. A small, rather complicated design, typical of many machine parts of conventional construction. Converted to welded steel construction with these results:

JUSTICE TO THE DESIGN

Rolled steel, applied exactly where needed, provides maximum strength with minimum weight. Cut weight from 100 pounds to 80 pounds.

JUSTICE TO THE COST

Former design $15.00.
Welded design $8.71.
Saved $6.29 or 42%.

JUSTICE TO THE OUTPUT

Standard steel material, cut and welded as required, speeds output and makes constant improvements easy and inexpensive.

HENCE: *The welded design accords justice to the worker . . . to the stockholder . . . and to the user.*

The Lincoln Engineer nearby will gladly help provide the *know-how* to improve *your* design, cut *your* costs and boost *your* output with Arc Welding. Studies in Machine Design free on request.

THE LINCOLN ELECTRIC COMPANY • DEPT. L-1 • CLEVELAND 1, OHIO

America's greatest natural **recourse**

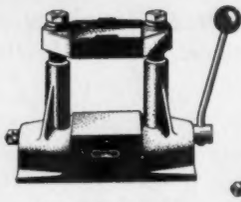
ARC WELDING

The New Woodworth "Cone-Lok" Jigs

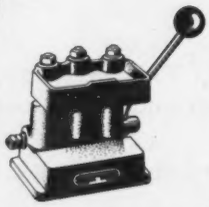
WOODWORTH "CONE-LOK" Jigs utilize the great braking power of perfectly mated male and female cones. This principle assures maximum locking effect in either direction. WOODWORTH "CONE-LOK" Jigs are rugged, have few moving parts, are more adaptable, have sealed-in lubrication, built-in safety and the mechanism is protected from chips.

Catalogue No. 45-J describing the sensational "Cone-Lok" principle is now available. *Write for your copy.*

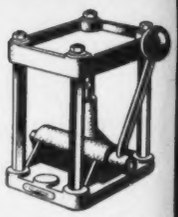
ACCURACY YOU W CAN TRUST



Bridge Type Jig for heavy duty.



All Purpose Jig for general machine shop work.



"Up-Clamp" Type Jig for close tolerance work.

The Jack-Lok, a special fixture clamp using the "Cone-Lok" principle for use in special fixture designs is available.

WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN

PRECISION GAGES • PRECISION MACHINED PARTS • PRECISION TOOLS

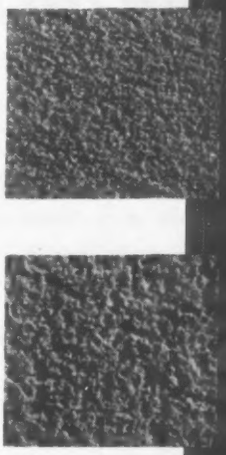
NEW!

A Norton OPEN STRUCTURE Crystolon Wheel *for Grinding Carbide Tools*

It lasts longer, cuts faster and cooler and requires less dressing than regular type silicon carbide wheels. That's what field tests are showing about the Norton OPEN STRUCTURE Crystolon Wheel on carbide jobs requiring considerable stock removal—such as the rough grinding of large single-point tools.

Stocked in size 14 x 4", 1½" rim, plate mounted in these popular specifications, 39C60-F12VP and 39C60-G12VP.

These close-up photographs of wheel surfaces tell the story. Both wheels are 60 grit, the top one is No. 7 structure, the bottom No. 12 OPEN STRUCTURE. You can easily see why the No. 12 structure with its large pore space will cut faster and cooler.



NORTON COMPANY
Worcester 6, Mass.
Distributors in all Principal Cities

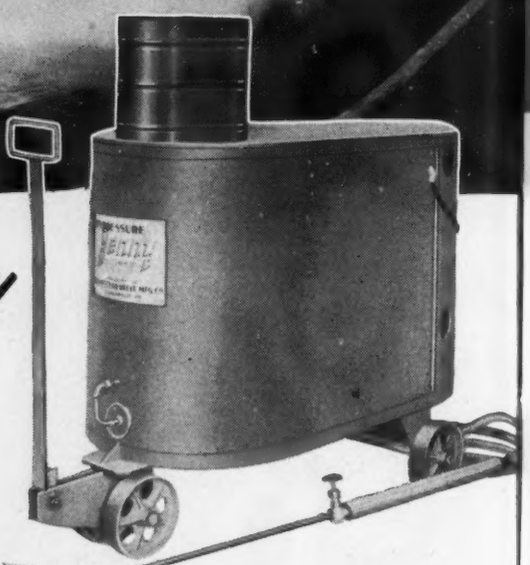
NORTON ABRASIVES

W-1009

The JENNY "Steam Spray" Way

Hypressure Jenny does hundreds of plant cleaning jobs *8 to 10 times quicker and cheaper* than by slow, inefficient hand methods. The Jenny Steam-Spray Way is the *fastest, most thorough* cleaning method known. It combines in a steam vapor spray, the right amounts of steam, highly atomized hot water, cleaning compound and pressure, to do a 100% cleaning job. This powerful steam cleaning spray, dissolves, cuts and flushes, oil, grease and dirt from surfaces almost instantly. Operating costs are extremely low. In addition to saving money on all plant cleaning jobs, the Jenny Steam-Spray Way speeds machine repairs by saving up to 40% of mechanics' time usually lost wiping dirt and grease from tools and equipment.

There is a Hypressure Jenny model to suit your requirements. Write today to find out how HYPRESSURE JENNY can save *you* time and money.



COMPACT . . . PORTABLE . . . ACCESSIBLE

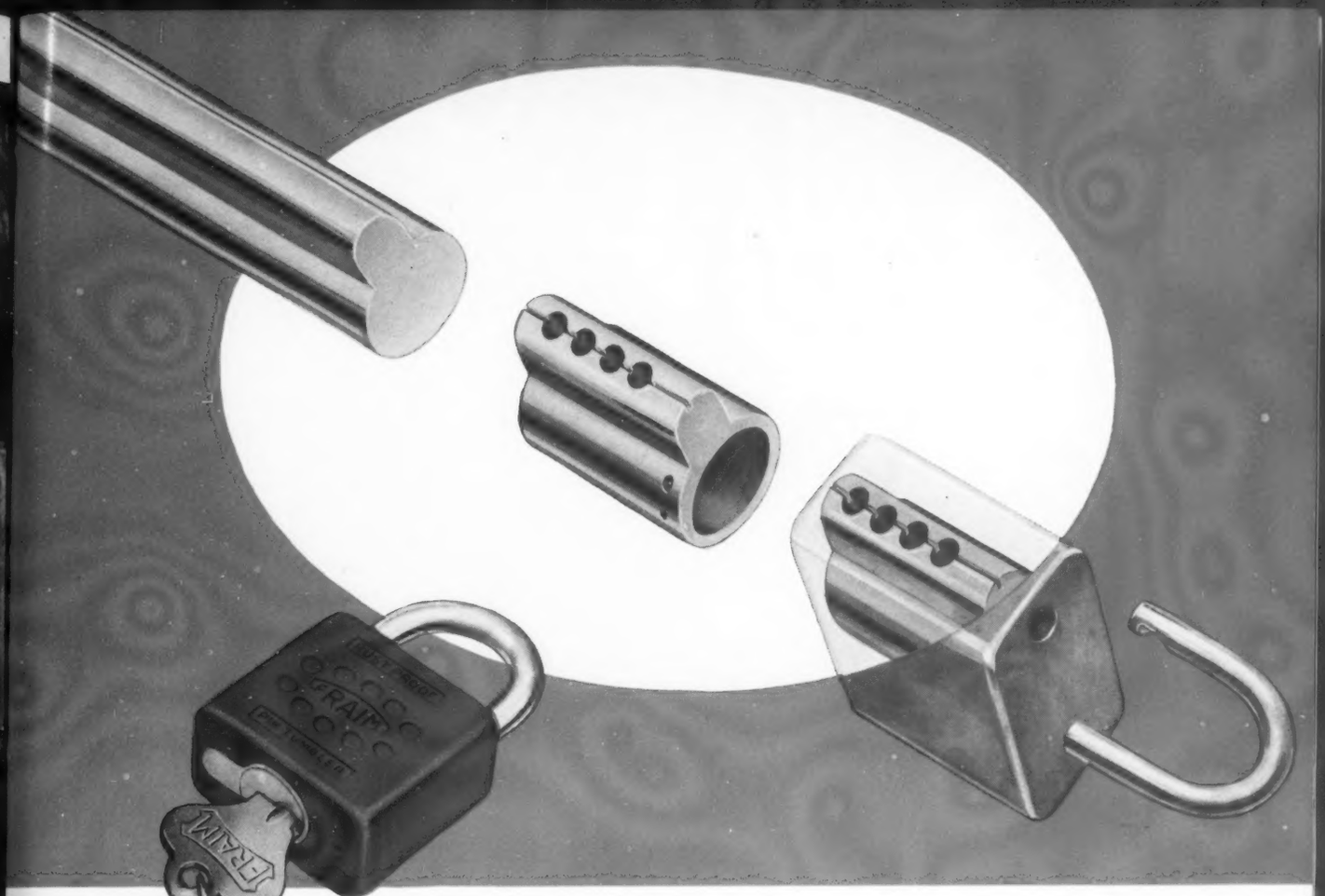
Hypressure Jenny *Cleans*

Machinery	Booms
Cranes	Tank Cars
Conveyors	Trucks
Engines	Floors
Transformers	Walls
Shafts	Windows
Belts	Buildings
Compressors	Skylights
Hoists	Lavatories

HYPRESSURE JENNY DIVISION OF

HOMESTEAD VALVE MFG. CO.

P. O. BOX 22 CORAOPOLIS, PENNSYLVANIA



Here again—
the answer was an *Extruded Shape*

The E. T. Fraim Lock Company of Lancaster, Pa., has a world-wide reputation for the manufacture of high grade locks, built to unusually accurate specifications. When large-scale production of pin tumbler padlocks for the Armed Forces was undertaken recently, a review of design and materials became necessary.

The component parts—pins, tumblers, springs, case, shackle, bolt, plug and keys—all could be produced readily and in adequate quantities . . . that is, all but the brass sleeve with its unusual shape. And there *was* a problem!

Brass castings were being used, requiring machining all over for the intricate assembly. Lack of uniformity, coarse grain structure and surface roughness and irregularities left much to be desired.

The solution was found in the Anaconda Extruded and Drawn Brass Shape illustrated above. Here was wrought metal, smooth of surface and uniformly accurate in cross section. Sleeves could be "sliced" off long mill lengths—and the parts would fit drill jigs and milling fixtures without filing or fussing. Several operations, previously necessary, were entirely eliminated. Rejections were held to a minimum. And as in so many similar instances, the uniform grain structure and high rate of machinability of the extruded part made possible faster, more accurate production, saving time and tools.

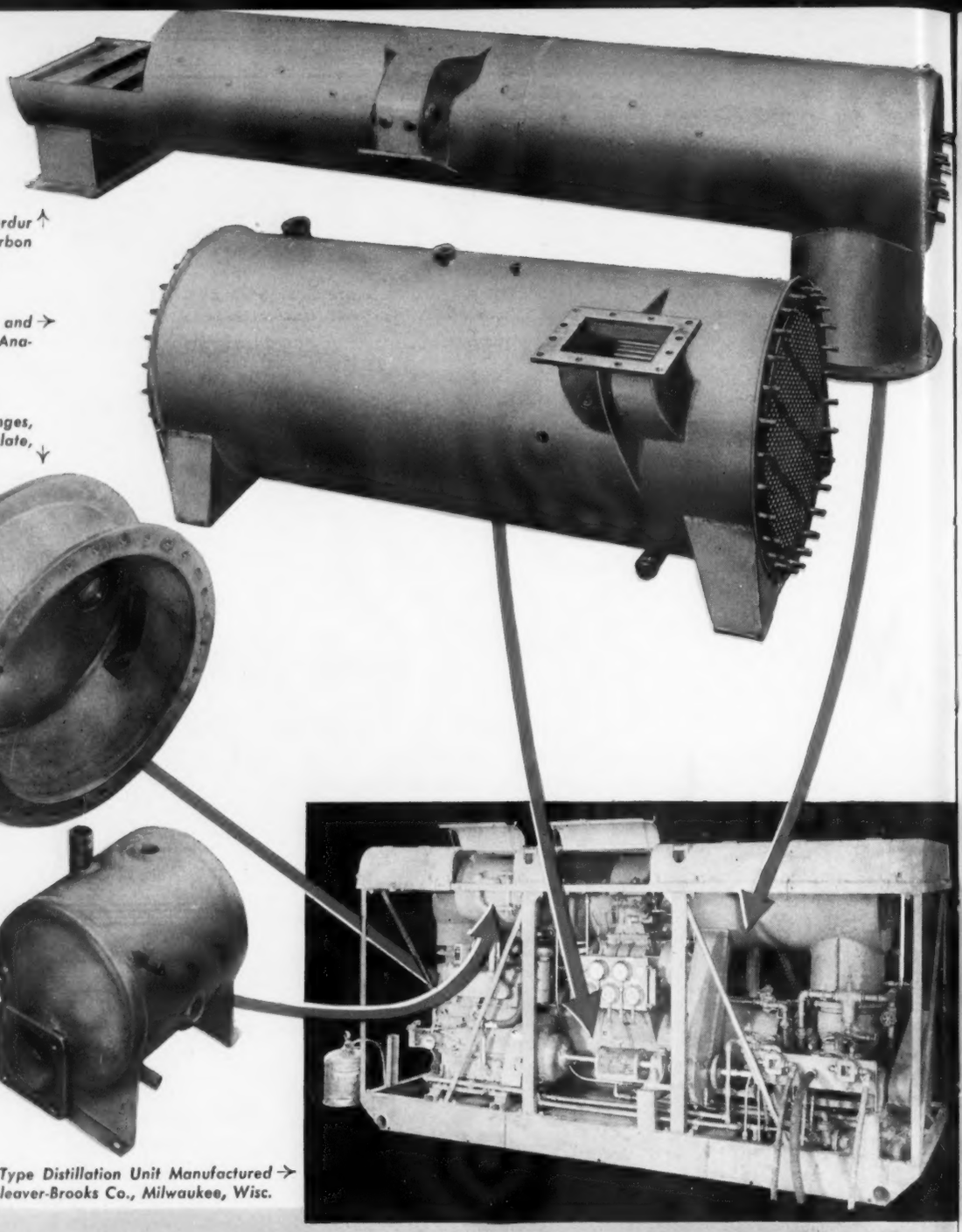
Similar design or production problems may appear in your plant, anywhere from the drawing board to the assembly bench. If they do, remember that our Technical Department will be glad to work with you. 45187

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut
Subsidiary of Anaconda Copper Mining Company
In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ont.*

ANACONDA
From mine to consumer

Anaconda Extruded & Drawn Shapes



Evaporator and flume of Everdur sheet-metal construction, carbon arc welded with Everdur rod.

Condenser: Shell, tube sheets and bolts are Everdur; Tubes are Anaconda Arsenical Admiralty.

Discharge Head, including flanges, made of Everdur sheet and plate, carbon arc welded.

Distillate Boiler: All Everdur, including supports and pipe connections. Carbon arc welded.

Compression Type Distillation Unit Manufactured by Cleaver-Brooks Co., Milwaukee, Wisc.

SO THERE'S WATER TO DRINK FOR OUR FIGHTING MEN...

This "seagoing waterworks" uses *Everdur* for ruggedness and dependability

In amphibious operations, this Cleaver-Brooks Compression Type Distillation Unit is among the first items of equipment to be put ashore. From sea water or jungle swamp it will deliver up to 175 gallons of distilled water an hour—pure water for drinking, cooking and other purposes. Little wonder that Everdur Metal is used so extensively and effectively for these important components. For Everdur* has established an outstanding record for service in waterworks and similar fields. It combines strength and corrosion resistance in economical lightweight, welded, sheet-metal construction.

*Reg.U.S.Pat.Off.

THE AMERICAN BRASS COMPANY

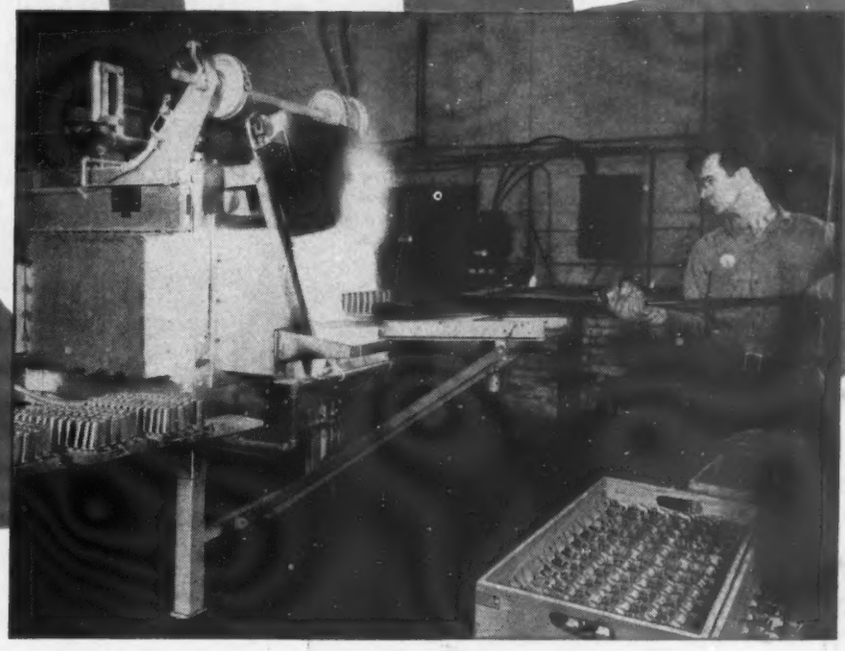
General Offices: Waterbury 88, Connecticut

ANACONDA
from mine to consumer

Everdur Copper-Silicon Alloy

THIS LINDBERG BRAZING FURNACE GIVES YOU

6 in 1 Furnaces



You can use this new completely engineered furnace for:

1 High temperature copper brazing
2 Low temperature silver brazing
3 Sintering of powder metals
4 General tool hardening
5 High speed tool hardening
6 Bright annealing

Keep it as busy as you can with brazing, but if your brazing production is irregular this furnace offers ideal facilities for any other heat treating operation requiring a protective atmosphere. A mid-west manufacturer, for example, hardens the dies used for forming the parts to be brazed.

Globar elements develop a temperature up to 2500° F. At copper brazing temperatures of 2050° F., the Globar elements are not forced to their full heating capacity and the additional degrees up to 2500° F. allow plenty of range in which to heat any of the high speed tool steels for hardening and also for sintering certain powder metals. These non-metallic elements are easily replaced in a few minutes without cooling down the furnace, virtually eliminating production delays. A choice of protective atmospheres allows treatment of any kind of steel.

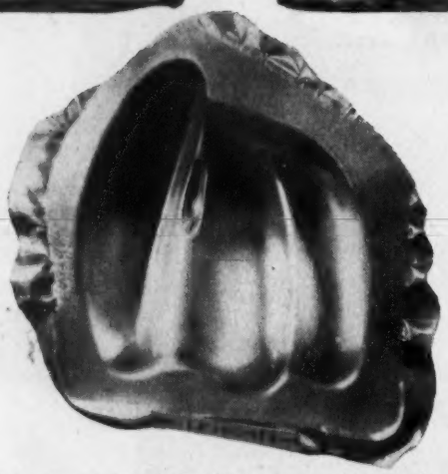
Find out all about this versatile hand-pusher type furnace. Write now for bulletin 200. Lindberg Engineering Company, 2466 W. Hubbard Street, Chicago 12, Illinois.

LINDBERG Furnaces

SUPER-CYCLONE • CYCLONE • HYDRYZING • BRAZING

DIES *that can be poured!*

yet capable of 20,000 to 30,000 stampings from a single set.



Cecostamping of large sheet metal part from dies above.

Note smooth, even contours without wrinkling or reduction of section.

These dies are cast of lead, zinc or other soft metals or alloys in plaster of paris molds. When run is completed or part is changed, dies can be melted and metal used again.

Photographs above show simple shapes with operations confined to single blows without draw rings or progressive stamping. Yet observe the clean, sharp impression—without distortion, tearing or uneven stretching of metal.

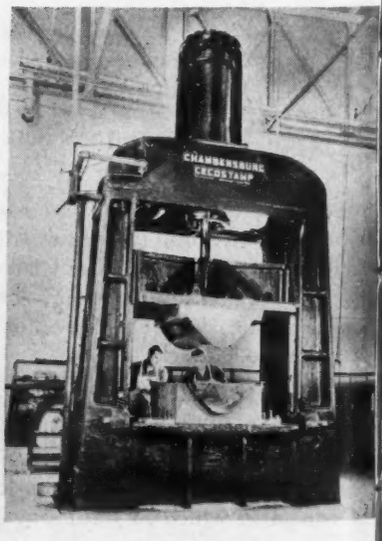
The CECOSTAMP is a high production, impact-type drop stamp designed to form metal parts from sheets of high strength and low ductility.

It was designed by Chambersburg engineers to solve the immediate and urgent sheet metal production problems of the aircraft industry.

It is in use in practically every airplane factory in the United States.

It will unquestionably be a big factor in general industrial sheet metal production after the war.

We shall be glad to send complete information.



CECOSTAMP

CHAMBERSBURG ENGINEERING CO. CHAMBERSBURG, PENNA.

No matter what Paint Vehicle is needed . . .

- SYNTHETIC RESINS
- NATURAL RESINS
- MODIFIED SYNTHETICS
- DRYING OILS

RED LEAD'S WIDE COMPATABILITY

makes its Extra Rust Protection Available

The fact that Red Lead is generally accepted throughout industry as the standard metal protective paint indicates two things:

1. *That it must be widely adaptable to various service conditions.*
2. *That it must offer something* EXTRA *in the way of rust prevention.*

Red Lead's versatility is due principally to its compatability with the wide range of vehicles needed to answer present-day service demands. It can be used with practically every type of paint vehicle on the market—synthetic resins, natural resins, drying oils, and combinations of these.

Thus, paints for any metal protective purpose can be formulated with Red Lead. Since almost any paint vehicle can be used with Red Lead, a broad range of drying requirements can be met—anything from the normal drying primer used on structural steel to the quick-drying paint essential to present-day production schedules.

Why Red Lead means Extra Rust Protection

Red Lead has the property of counteracting acid conditions, recognized as accelerators of rust. In the presence of various acids, Red Lead forms insoluble lead salts at the approximate rate at which the acids are supplied.

This is true whether the acid originates from acid-forming environments, such as gas, smoke and moisture in the atmosphere, or from the decomposition of the vehicle. Thus, a rust-inhibiting condition is maintained with a Red Lead paint.

Red Lead also forms an adherent protective shield which prevents electrochemical action, another prime cause of rusting.

Specify RED LEAD for All Metal Protective Paints

The value of Red Lead as a rust preventive is most fully realized in a metal paint where it is the only pigment used. However, its rust-resistant properties are so pronounced that it also improves any multiple pigment paint.

No matter what price you pay, you'll get a better paint for surface protection of metal, if it contains Red Lead.

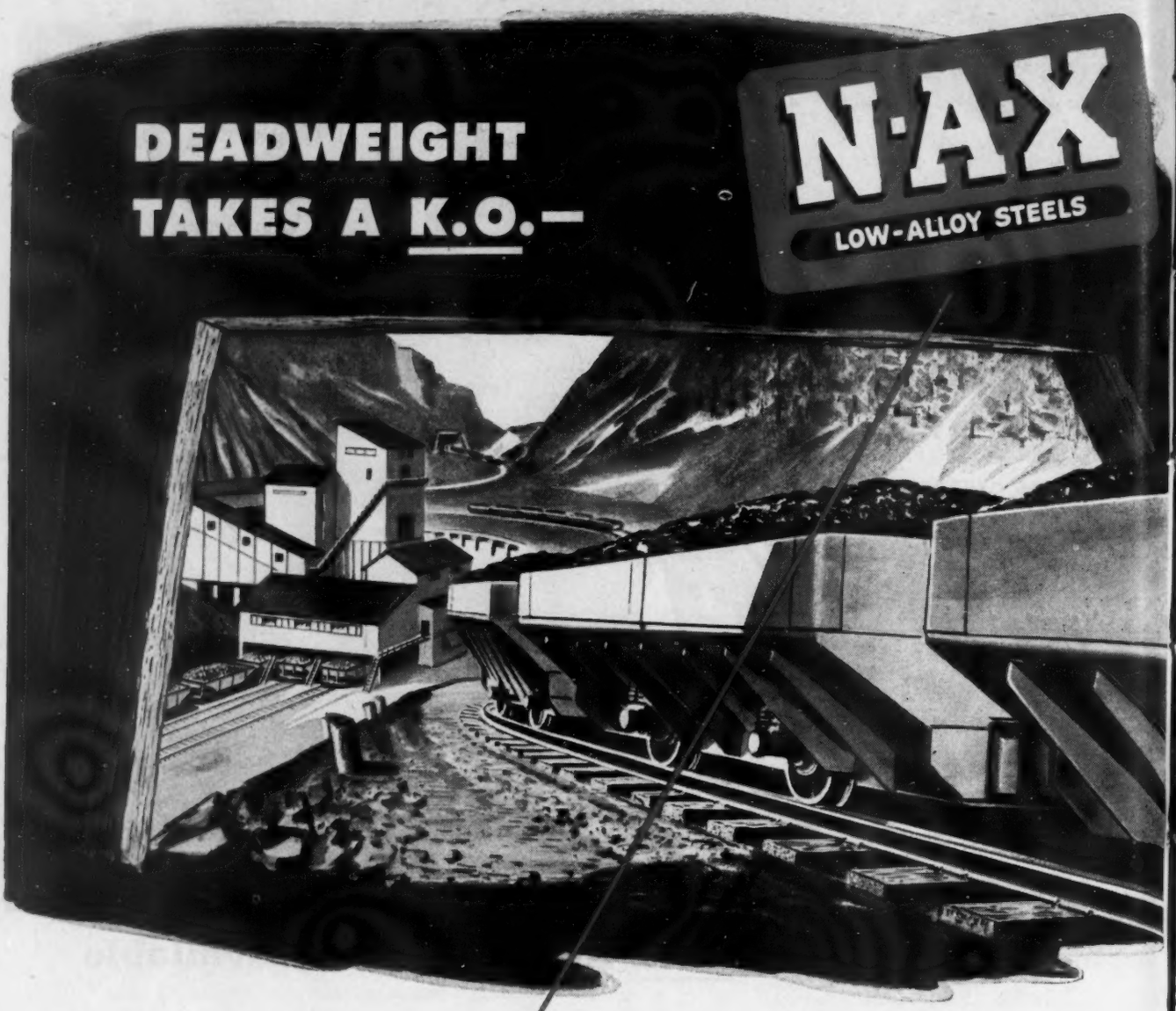
Write for New Booklet—"Red Lead in Corrosion Resistant Paints" is an up-to-date, authoritative guide for those responsible for specifying and formulating paint for structural iron and steel. It describes in detail the scientific reasons why Red Lead gives superior protection. It also includes typical specification formulas—ranging from Red Lead-Linseed Oil paints to Red Lead-Mixed Pigment-Varnish types. If you haven't received your copy, address nearest branch listed below.

* * *

All types of metal protective paints are constantly being tested at National Lead's many proving grounds. The benefit of our extensive experience with paints for both underwater and atmospheric use is available through our technical staff.

NATIONAL LEAD COMPANY: New York 6, Buffalo 3, Chicago 80, Cincinnati 3, Cleveland 13, St. Louis 1, San Francisco 10, Boston 6 (National-Boston Lead Co.); Pittsburgh 30 (National Lead & Oil Co. of Penna.); Philadelphia 7 (John T. Lewis & Bros. Co.); Charleston, W. Va. (Evans Lead Division).

DUTCH BOY RED LEAD



when these FINE-GRAINED STEELS take over

In N-A-X low-alloy steels, manufacturers of mining equipment have what it takes to *knock out deadweight* in the design of cars, elevators, conveyors, tipples, screens and stripping shovels.

It's the old "one-two punch" proposition. N-A-X High-Tensile provides the extra strength in stressed members to permit more efficient design, lighter construction. N-A-X 9100 Series steels do the same for constructional parts that call for accurate heat-treatment, with abrasion-resistance an important factor.

Take advantage of the great strength, exceptional ductility, good corrosion-resistance, excellent weldability and high resistance to impact, wear and fatigue that these fine-grained N-A-X low-alloy steels offer. Put N-A-X High-Tensile and N-A-X 9100 Series steels on the job to cut down deadweight, step up payload and increase the life of your equipment.

GREAT STEELS FROM GREAT LAKES

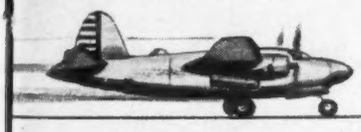
GREAT LAKES STEEL
Corporation

N-A-X ALLOY DIVISION • DETROIT 18, MICHIGAN

UNIT OF NATIONAL STEEL CORPORATION

IN FORGINGS You get MAXIMUM METAL QUALITY

...o-etch through a longitudinal cross-section of an ...n aircraft engine crankshaft, shows how the fi...re-flow lines have been directionally worked into ...t position to provide the utmost strength and ...ness to meet the stress concentrations exactly ...e they occur under actual service conditions. Note, ...degree of grain refinement and density of flow ...which indicates that the penetration of the impact ...ure in forging has been most intense, exactly ...re the stress on the crankshaft is highest.



7 ADVANTAGES Forgings Offer

...igh tensile and impact strength obtained through concentration of grain structure and fibre-like flow lines.

•

Correctly proportioned combination of physical properties to meet a specific service condition.

•

...eduction of dead weight; maximum strength and toughness in lighter sectional thicknesses.

•

...ess time to machine and finish.

•

...orgings facilitate rapid assembly through a welding adaptability of widest range.

•

...orgings reduce accidents to men and machines; provide a greater margin of safety.

•

...orgings can take it; maximum strength and tough... through a concentration of fibre-like flow line ...tructure at points of greatest shock and stress.

In forgings, metal quality can be developed to the exact degree required to meet a specific service condition. *A product fortified with the metal quality found in forgings out-performs other products.* Dependable performance is assured by high tensile and impact strength, toughness and high fatigue resistance—qualities which are obtained by forging metal in closed impression dies, which process directions the fibre-like flow lines to meet the stresses and shocks which occur under actual service conditions.

Forgings offer many advantages beyond those called for in the specifications. A re-check of every stressed part, as well as simple handles and levers, against the seven advantages that forgings offer, may reveal the possibility of improving a part or a product; or the opportunity to strengthen a part or to give it longer service life; to lessen weight; to reduce cost of machining and finishing and to speed up assembly. Consult a forging engineer connected with your source of supply about how to utilize to the utmost the metal quality of forgings in the production of your peacetime product. Backed by years of experience, he quickly defines the exact nature of your problem and will guide you in utilizing up-to-date forging techniques to obtain all the advantages that forgings offer.

SYMBOLIC EMBLEM OF THE DROP FORGING ASSOCIATION

DROP FORGING ASSOCIATION
605 HANNA BUILDING · CLEVELAND, OHIO

DROP FORGING ASSOCIATION
605 Hanna Building • Cleveland 15, Ohio

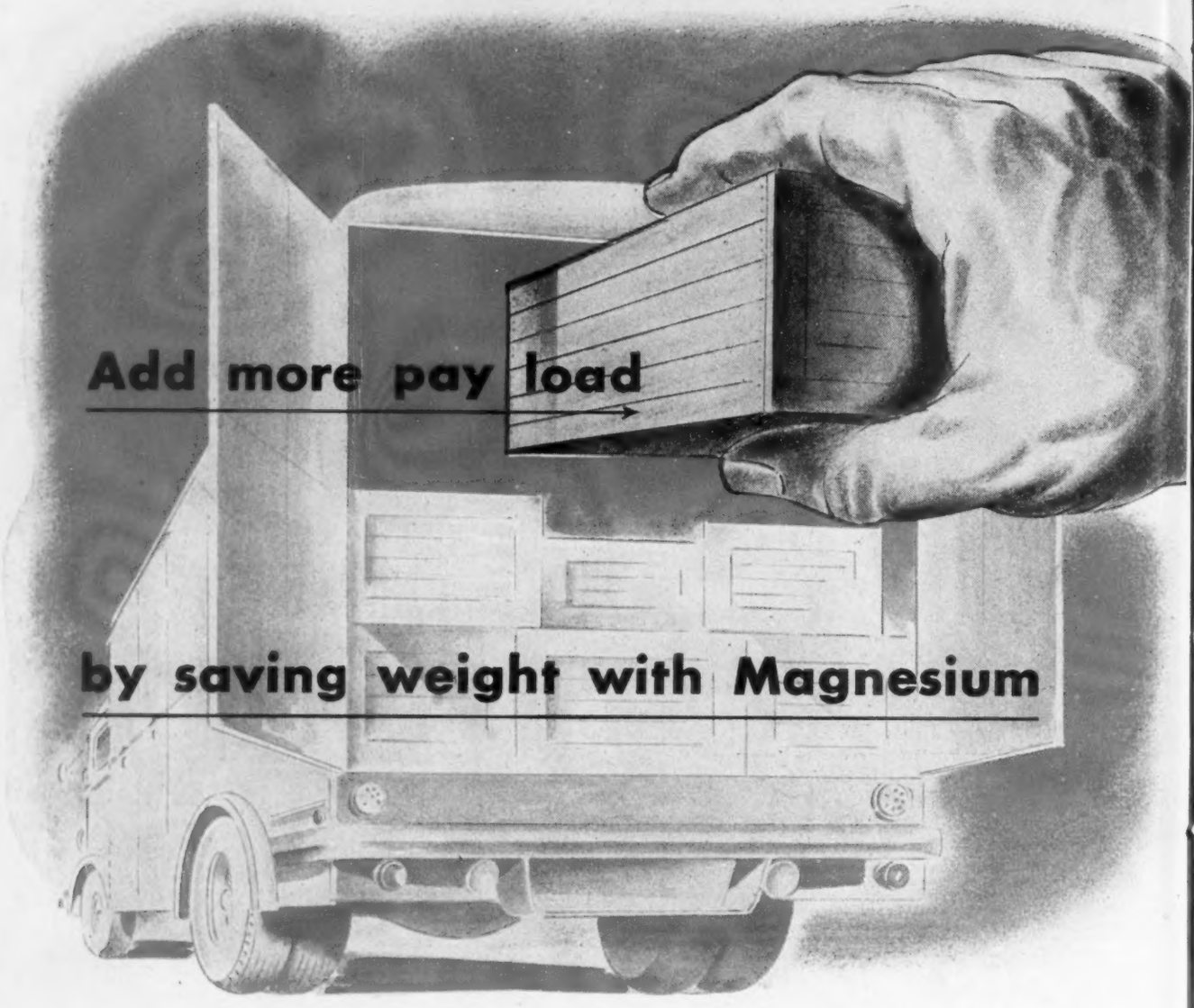
☐ Booklet on "Metal Quality—How Hot Working Improves the Properties of Metal."

☐ "Drop Forging Topics," issued ten times a year.

Name *Position*

Company

Address *City* *State*



Haul more cargo without exceeding highway load limits. No radical change in design needed. Just lop off *unnecessary* topside weight by using magnesium . . . and still have all the structural strength required.

There are plenty of places where this can be done in truck bodies. You can use magnesium for side posts and panels, corner castings, toprails, roof bows and roof sheet. You will save considerable dead weight by replacing many of the heavy metal parts.

American Magnesium engineers are old hands at weight saving. They will gladly help you and your bodybuilder employ magnesium to best advantage in cutting off needless pounds.

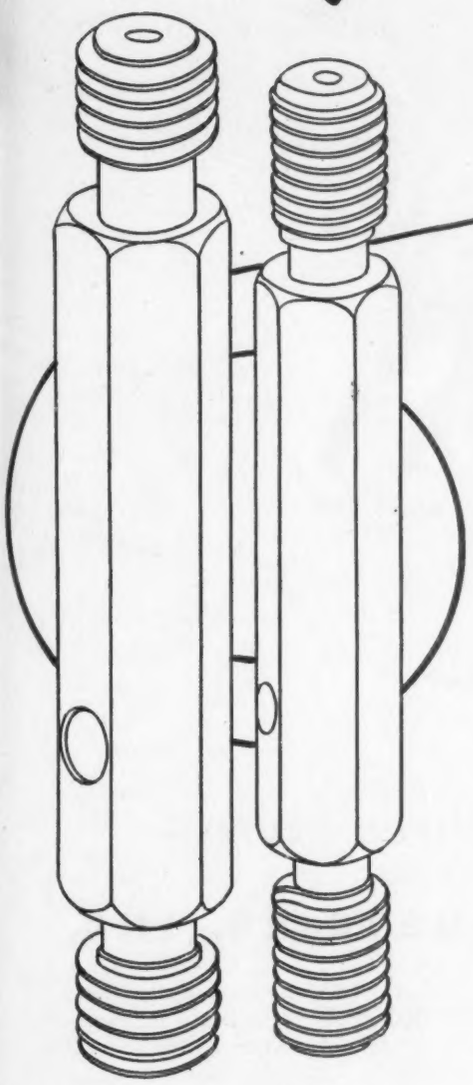
Write Aluminum Company of America, Sales Agents for American Magnesium Products, 1721 Gulf Building, Pittsburgh 19, Pennsylvania.

MAGNESIUM MAZLO PRODUCTS

AMERICAN MAGNESIUM CORPORATION

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA

Right Face!



A FACT!.....
NOT A COMMAND

It is a well established fact that thread gages faced with rotary welded stellite give you more economy, longer life and higher quality precision inspection.

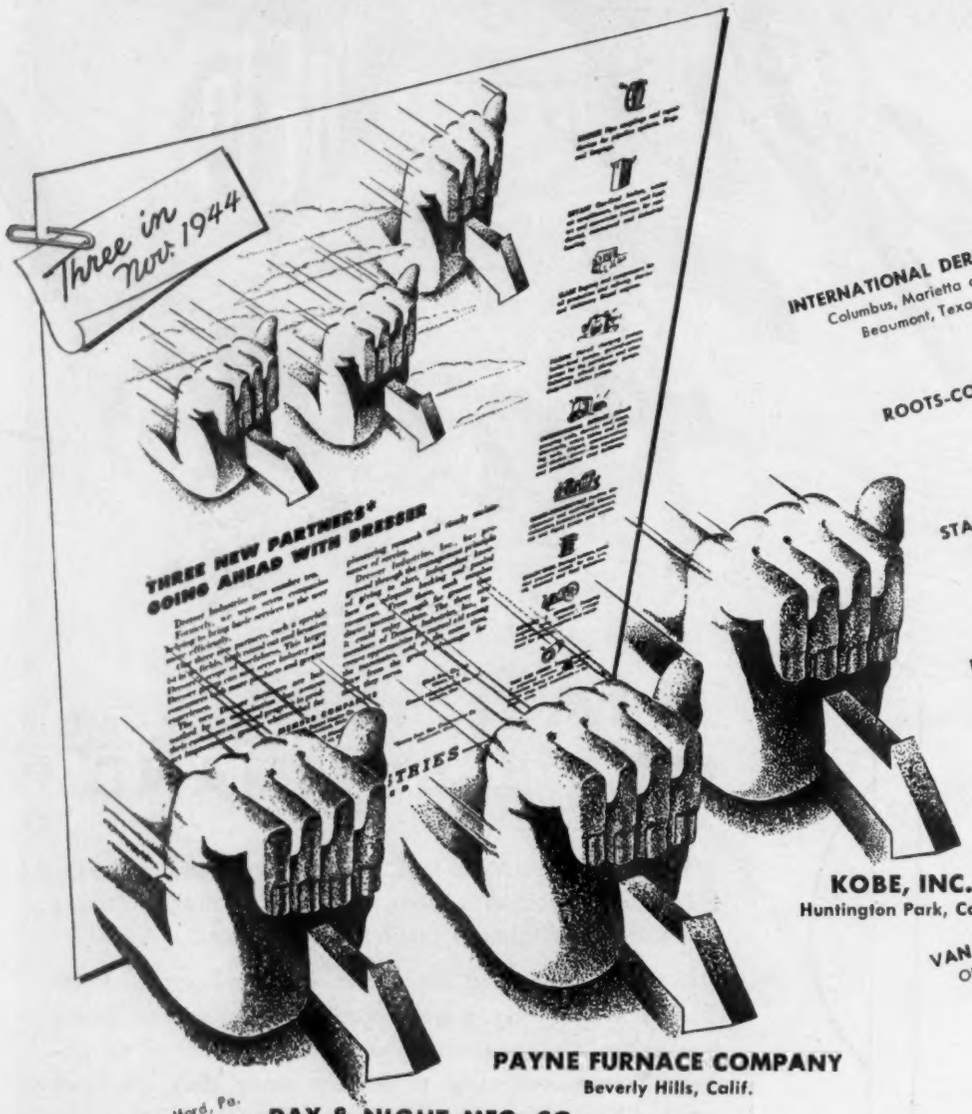
Redford Engineering Co. gages are faced with Stellite Rotary Welded on a steel core. These Redford gages are extremely resistant to abrasion. They have an unusually low coefficient of friction since they are basically different from the materials to be inspected.

Therefore it is readily apparent that the inspection operation can be completed with less drag on the gages. Their efficiency is not affected by shop temperature changes.

Redford Rotary Welded gages in constant use outlive steel gages from 5 to 20 times. Increased life substantially reduces daily gaging costs. Longer positive gaging is in direct relation to these lasting qualities.

Write us today for further information regarding these highly efficient gages. Your inquiries will be given prompt attention.

Redford ENGINEERING CO.
21200 W. 8 MILE ROAD
DETROIT 19, MICHIGAN



INTERNATIONAL DERRICK & Equipment Co., Columbus, Marietta and Delaware, Ohio; Beaumont, Texas; Torrance, Calif.

ROOTS-CONNERSVILLE Blower Corp., Connersville, Ind.

STACEY BROS. Gas Construction Co., Cincinnati, Ohio

BOVAIRD & SEYFANG Mfg. Company, Bradford, Pa.

DRESSER Manufacturing Co., Ltd., Toronto, Ont., Canada

KOBE, INC.
Huntington Park, Calif.

VAN DER HORST Corp. of America, Olean, N. Y. and Cleveland, Ohio

PAYNE FURNACE COMPANY
Beverly Hills, Calif.

DAY & NIGHT MFG. CO.
Monrovia, Calif.

DRESSER Mfg. Division, Bradford, Pa.

BRYANT Heater Company, Cleveland, Ohio

CLARK Bros. Co., Inc., Olean, N.Y.

PACIFIC Pumps, Inc., Huntington Park, Calif.

...again three more

BECOME PARTNERS IN

DRESSER INDUSTRIES, INC.

Dresser Industries continues its growth toward more efficient, more comprehensive service to customers. Three new partners now enlarge our scope of usefulness to the gas and oil industries.

Day & Night Manufacturing Co., supplies a remarkably efficient hot water heater for the home. Payne Furnace Company is unexcelled, particularly throughout the West, for its gas-fired steel heating equipment. These two companies perfectly complement and augment Bryant Heater Company, a Dresser Industries member which for 35 years has produced fully automatic, quality gas-fired heating appliances, most extensively used in the East.

Kobe, Inc., makes an ingenious hydraulically actuated oil-well pump, a fundamental development in view of the nation's need to go ever deeper for oil. This pump dovetails with oil-well drilling and production equipment offered by two other Dresser Industries members, Pacific Pumps, Inc., and International Derrick & Equipment Co.

Dresser Industries is now a team of thirteen companies pooling their resources for better products, better service to their customers.

Dresser Industries, Inc.
Terminal Tower, Cleveland 13, Ohio

CLEVELAND *Top Quality* HIGH CARBON CAP SCREWS

are made of C-1038 steel, heat treated to give you greater strength plus the additional toughness secured by Cleveland's method of manufacture—the famous Kaufman Process, originated in our plant. The rich black satin-like finish has rust-resisting qualities. Here is a dependable fastener of maximum strength and good appearance.

CLEVELAND *Top Quality* **FASTENERS**

The Cleveland Cap Screw Company

2917 EAST 79TH STREET • CLEVELAND 4, OHIO

Warehouses: Chicago, Philadelphia, New York, Los Angeles

Ask your Jobber for Cleveland Fasteners

MADE BY THE ORIGINATORS OF THE KAUFMAN PROCESS FOR GREATER STRENGTH AND ACCURACY

Asiatics Acclaimed this "Modern" Water Elevator

IMAGINE yourself living four thousand years ago, pumping water with this new Persian invention. What a wonderful improvement it was over lifting water a jugful at a time from the stream-bed...to irrigate crops or to carry home.

But the world left Persia and this marvelous labor-saving water elevator far behind. Why?

Because the western world discovered plentiful supplies of iron ore, learned how to make steel, how to fabricate it into pipe, sheets, plates, rods, wire, etc., and how to manufacture an endless variety of products that would amaze and confound those ancient Persian inventors. Pumps, valves, tanks, piping and other parts of modern water supply systems are possible for everybody only because steel manufacturers, such as Youngstown, have developed ways to produce steel and steel products in tremendous quantities, at a cost within reach of everyone.

So when you buy or use a piece of steel pipe, inexpensive and commonplace though it is, you may well realize that without our abundance of excellent steel we in America today might be using the ancient Persian water elevator-and still calling it modern.

QUALITY · YOUNGSTOWN · SERVICE

YOUNGSTOWN

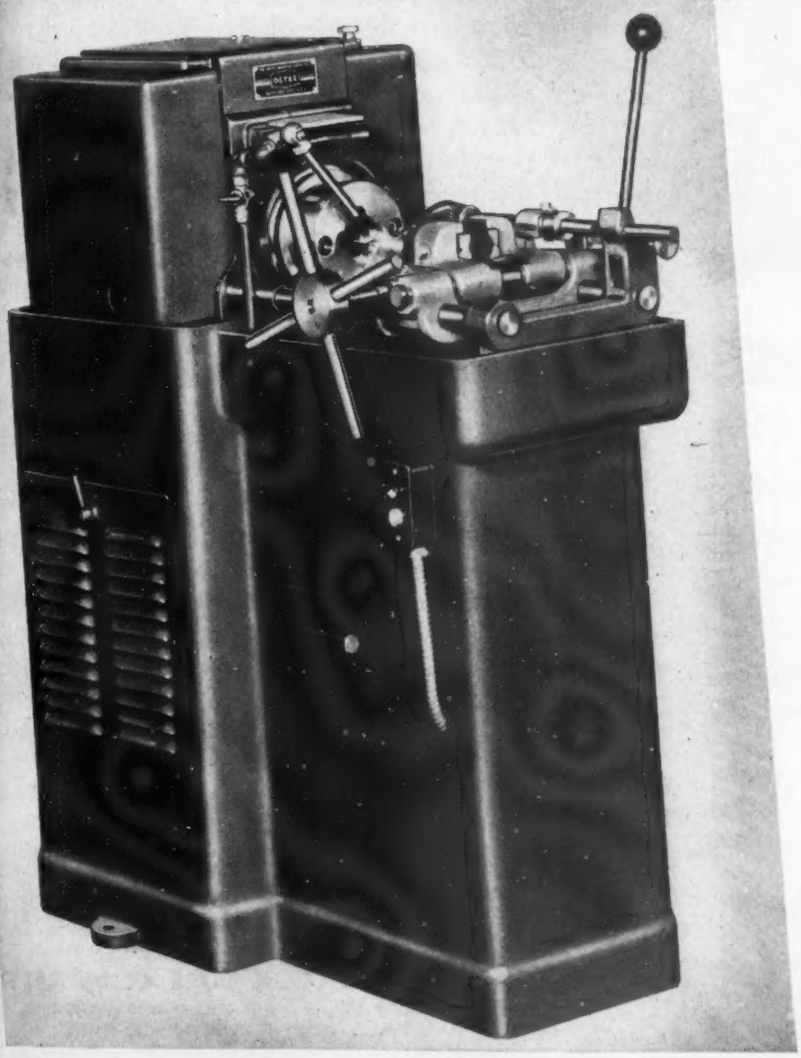
THE YOUNGSTOWN SHEET AND TUBE COMPANY
YOUNGSTOWN, OHIO

Manufacturers of
CARBON · ALLOY AND YOLOY STEELS

Pipe and Tubular Products · Sheets · Plates · Conduit · Bars · Coke Tin Plate · Electrolytic Tin Plate · Rods · Wire · Nails · Tie Plates and Spikes

FOR SPEED ON A WIDE VARIETY OF THREADING JOBS GIVE ME THIS

OSTER "Rapiduction" JUNIOR



No. 542 "RAPIDUCTION JUNIOR" is designed with revolving die-head and open type vise to handle a wide variety of threading jobs at top speeds and low unit costs. No time lost in handling stock in and out of machine.

Production speeds on bolts, rods, studs, pipe and nipples are unusually high for this size of threading machine. (Write for production estimates on your specific work. Full description of work is requested.)

Standard range is ¼" to 1¾". Pipe or nipple range ⅛" to 1¼".

Complete information about the Oster No. 542 "RAPIDUCTION JUNIOR" Threading Machine is available from the Oster distributor in your area, or write direct to us at Cleveland, Ohio.

OSTER

THE OSTER MANUFACTURING COMPANY, 2073 EAST 61st ST., CLEVELAND 3, OHIO, U. S. A.

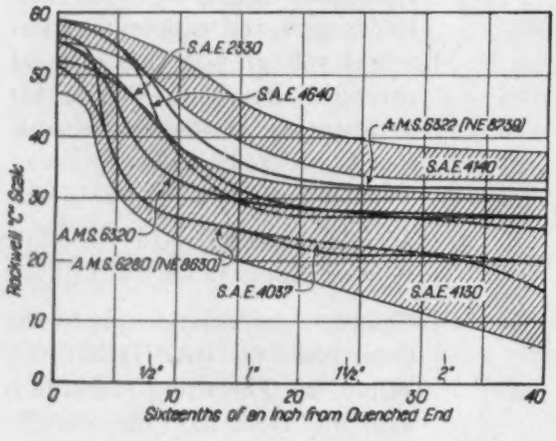
THESE TESTS PROVIDE

. . . TUBING OF THE HARDNESS RANGE YOU WANT

The Brinell hardness test shown in the picture at the upper right is only one of several steps taken at Babcock & Wilcox tube mills to give you effective technical control of physical properties in the tubing you use.

This test and others, plus a background of engineering and metallurgical experience that is unusually thorough, enables B&W to meet your tubing needs with a product made to specified hardness ranges—with control of structure for maximum machinability.

. . . TUBING STEEL OF PROVED HARDENABILITY



By means of the Jominy End-Quench test, illustrated at the left, B&W can furnish tubing that exactly meets predetermined hardenability requirements and with grain size control of the steel as desired. These production controls are a distinct advantage when mechanical parts made from alloy steel tubing require heat-treating after machining. It is your assurance that the exact physical properties desired in the finished parts will always be obtained — another reason why it pays to specify B&W tubing for your mechanical requirements.

TA-1293

B&W TUBES

SEAMLESS
Complete range of carbon and alloy steels
Sizes: ½ in. to 8⅝ in. O.D.

ELECTRIC-RESISTANCE WELDED
Carbon grades
Sizes: ⅛ in. to 4 in. O.D.

THE BABCOCK & WILCOX TUBE COMPANY

SEAMLESS TUBE DIVISION
BEAVER FALLS, PA.

WELDED TUBE DIVISION
ALLIANCE, OHIO

B & W MAKES BOTH

PRODUCT IN THE NEWS

STOP CORROSION

WITH THIS PLASTIC BASE MATERIAL APPLIED LIKE PAINT!

UCILON* is more resistant to *more* corrosive elements than any coating you ever tried.

Available in white, clear, black or colors.

Because of the special resins and solvents used, UCILON* is restricted today to specific end uses.

WHAT

UCILON* is a new surface coating material which resists *all* acids in commonly used concentrations—*all* alkalies and salts at ordinary temperatures—plus alcohols, petroleum derivatives and natural oils. It is non-toxic, non-conductive, inhibitive to fungus.

WHERE

UCILON* protects the surfaces of process equipment, piping, walls, beams, ductwork, tanks, etc., *where other coatings fail.* It produces an attractive, glossy finish on metals, wood, or concrete—gives products subject to corrosion extra service, extra sales appeal.

HOW

UCILON*, compounded from special synthetic resins, can be brushed, dipped or sprayed like ordinary paint. Formulations for special needs such as quick drying, elasticity, matte surface, etc.

*Trade Mark Reg. U. S. Pat. Office and Foreign Countries

UNITED CHROMIUM
INCORPORATED
51 East 42nd Street, New York 17, N. Y. • Detroit 7, Mich. • Waterbury 90, Conn.

FREE BULLETIN

Tells how you can save time, labor and materials in protecting surfaces against even the most destructive elements.

USE THIS COUPON

UNITED CHROMIUM, INC.
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Send illustrated UCILON* Bulletin without obligation.

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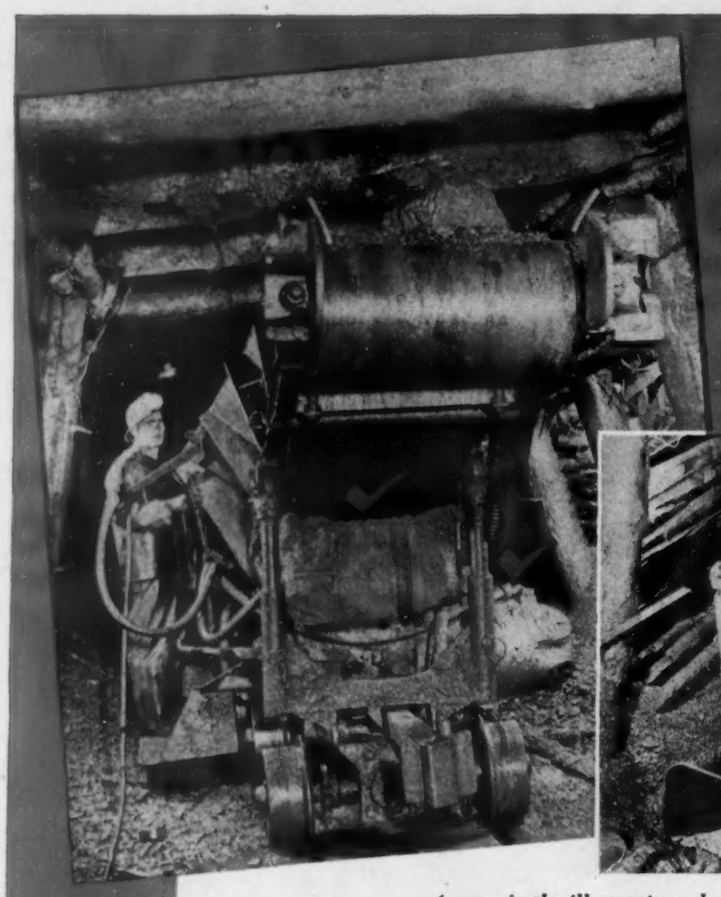
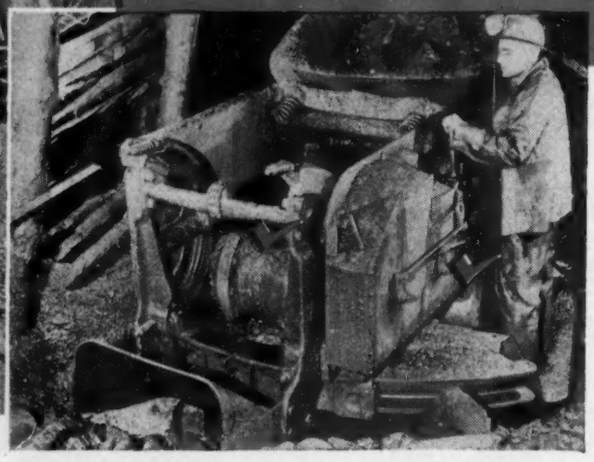


Specially designed Reliance Motors like these have what it takes for tough, punishing work.



Arrows in the illustrations above show locations of Reliance Motors in a heavy-duty mining machine.

Here's Where RELIANCE MOTORS REALLY TAKE A BEATING!

Where motors are called on to do tough, dirty, bruising work, it is important that they be designed with electrical as well as mechanical characteristics specifically fitted to the job.

Nowhere, probably, do motors take a worse beating than in the Eimco Rocker-Shovel, yet in this punishing service specially designed Reliance Motors have proved that they can both outperform and outlast other motors formerly used. And in many other tough assignments in many industries, Reliance installations are standing up equally well.

When you have need of motors that can really take it—or, for that matter, whenever you need motors for any industrial use—it's a good rule to call in a Reliance Application Engineer. He can put a lot of specialized experience at your service.

RELIANCE ELECTRIC & ENGINEERING CO.

1081 Ivanhoe Road • Cleveland 10, Ohio

Birmingham • Boston • Buffalo • Chicago • Cincinnati • Detroit • Greenville (S. C.) • Houston • Kalamazoo • Los Angeles • Minneapolis New York • Philadelphia • Pittsburgh • Portland (Ore.) • St. Louis • San Francisco • Syracuse • Washington, D. C. • and other principal cities.

RELIANCE A-C D-C MOTORS

"MOTOR-DRIVE IS MORE THAN POWER"

Here is low finned tube—all one piece—that gives you more BTU's per dollar than plain tube. Being extruded from the original tube, the fin structure is not affected by vibration or sudden heat changes.

TRUFIN with low fins has been found most practical and highly efficient in applications in shell and tube condensers and in liquid-to-liquid heat exchangers.

Ends of the tubes are free from fins and, being the same diameter on the O.D. as the overall fin-height, the ends are similar to those of plain tubes and can be rolled or brazed into tube sheets.

Because TRUFIN is integral, you can depend on its giving you long efficient performance under almost all conditions.

Available in the following alloys: copper, aluminum, aluminum brass, cupro-nickel, brass, stainless steel, Admiralty, nickel.

Write to Detroit for additional data on TRUFIN

☆

WOLVERINE

TUBE DIVISION

CALUMET & HECLA CONSOLIDATED COPPER COMPANY

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In Canada: UNIFIN TUBE CO., LONDON, ONT.

BUY MORE BONDS

ARISTOLOY ... *electric furnace steel*

Quality at every turn ....

● To produce top quality in all ARISTOLOY Electric Furnace Steels, steel bars pass through a battery of Copperweld's Billeteers. After the bar has been carefully inspected and marked for operation, cutting heads chip away any imperfection and the bar is on its way to the next quality guarded operation. ● You'll make no mistake specifying ARISTOLOY, because every operation is as carefully guarded, assuring the finest quality in electric furnace steels.

ARISTOLOY STEELS

AIRCRAFT QUALITY STEELS
BEARING QUALITY STEELS
CARBON TOOL STEEL
ALLOY TOOL STEELS
NITRALLOY STEELS
STAINLESS STEELS

WARREN, OHIO
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Branch Offices in Principal Cities

THE COPPERWELD STEEL COMPANY
ARISTOLOY INTERNATIONAL COMPANY • Export Div.

Upton ELECTRIC SALT BATH FURNACES

What Depth do You Want?

7 FT. 15 FT. 25 FT. 50 FT. ?

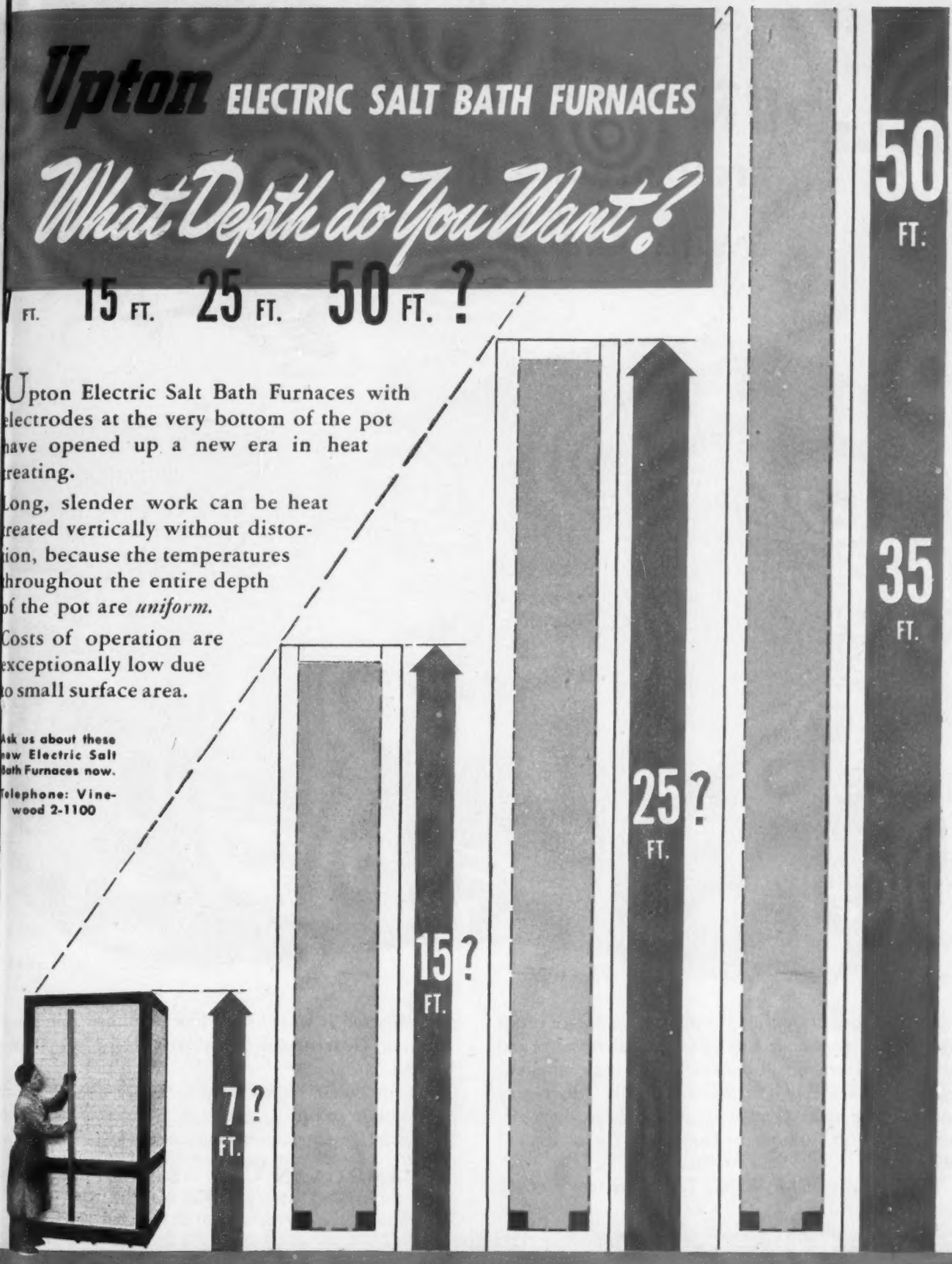
Upton Electric Salt Bath Furnaces with electrodes at the very bottom of the pot have opened up a new era in heat treating.

Long, slender work can be heat treated vertically without distortion, because the temperatures throughout the entire depth of the pot are *uniform.*

Costs of operation are exceptionally low due to small surface area.

Ask us about these new Electric Salt Bath Furnaces now.

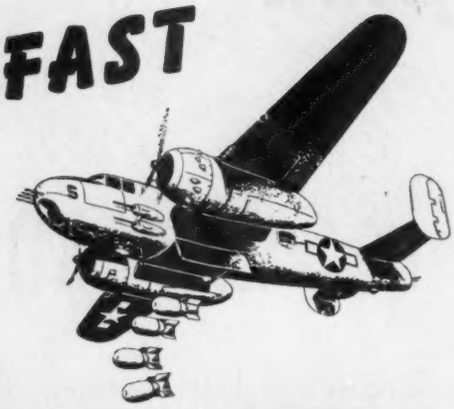
Telephone: Vinewood 2-1100

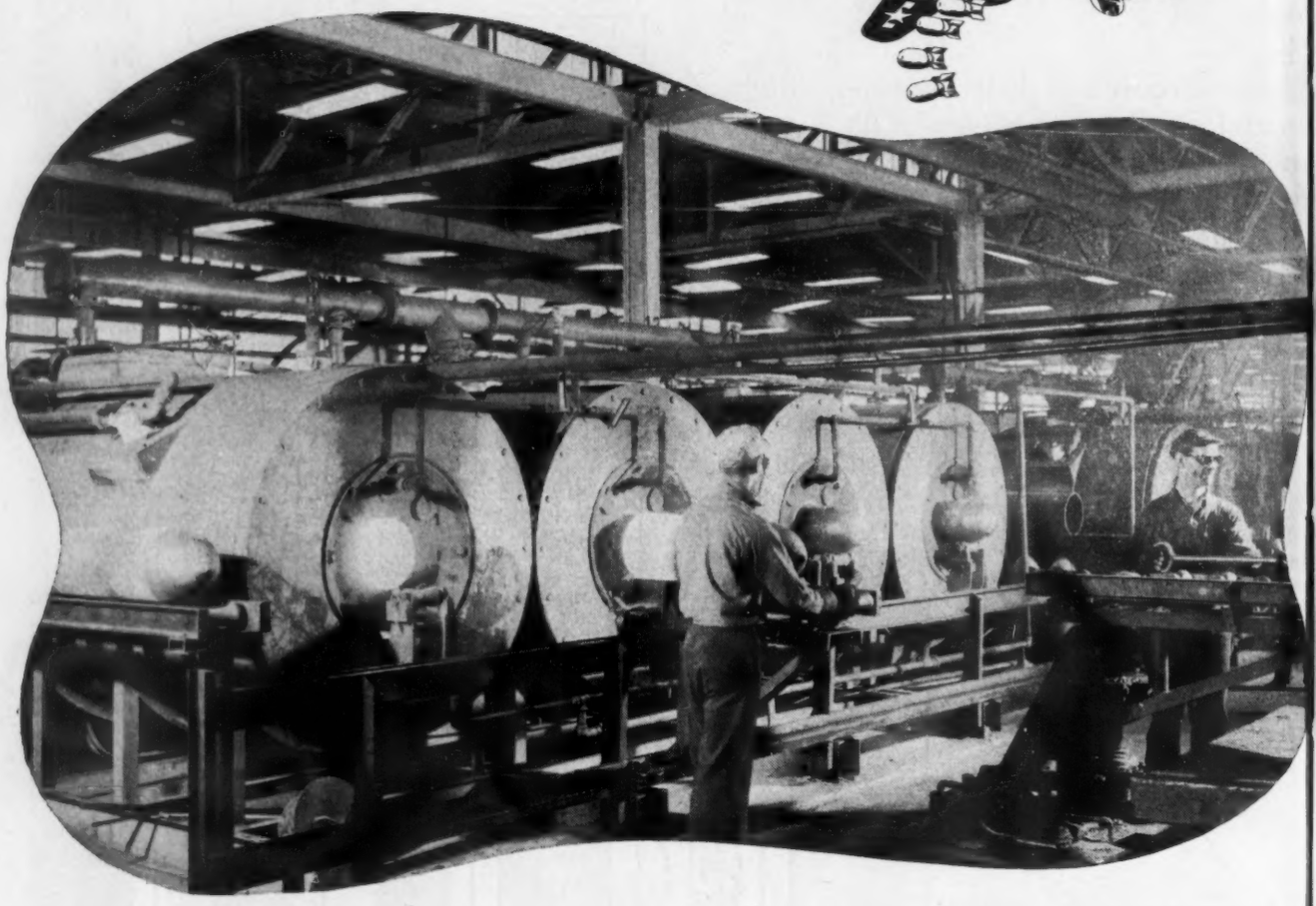


Upton ELECTRIC FURNACE DIV.

7455 MELVILLE AT GREEN ● DETROIT 17, MICHIGAN

ALL-PURPOSE BOMBS roll off the line FAST with GAS





When the Scaife Company, Oakmont, Pa., were called from peacetime manufacture of range boilers, tanks and cylinders, to turn out all-purpose bombs, they unhesitatingly chose Gas fuel for their new equipment. In forging and spinning these bomb-nosings, speed, accuracy and high fidelity to Government requirements were attained with Gas.

In the words of Mr. R. G. Taylor, Secretary of the Company—

"We liked the easy and effective way we were able to apply gas fuel to our various production methods for many years before the war. When the problem of building for war production came, we felt no uncertainty in making gas the choice for these new bomb-nosing furnaces. Gas has carried us through nicely, as we expected it would, and has simplified our job of meeting Government specifications for all-purpose bombs."

When civilian requirements can once more be filled, Gas will do an equally good job. Be ahead, consult the Industrial Gas Engineer of your local Gas Company, now.

AMERICAN GAS ASSOCIATION
INDUSTRIAL AND COMMERCIAL GAS SECTION
420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

THE TREND IS TO GAS
FOR ALL INDUSTRIAL HEATING

BUY WAR BONDS—HELP SPEED VICTORY!

Plymouth 65-ton Diesel Flexomotive (mechanical drive) in operation in one of the country's outstanding steel mills.

That's only part of the picture. With a Plymouth Flexomotive pushing the loads through, steel mills keep *days* ahead, *dollars* ahead.

Day in and day out, under all kinds of conditions, Flexomotives deliver the kind of track haulage performance that pays off in production. Throughout the country . . . right now . . . they are setting new standards for moving more tonnage, faster, and at lower cost.

TRACK HAULAGE IS CHEAPER HAULAGE

If that's what you're looking for, write for facts and figures. In our forty years of building locomotives we've compiled records on installations similar to yours . . . and can tell you which of our models, from 2½ to 70 tons, gasoline or diesel, best fills the bill. We'll be glad to do so . . . at no obligation.

PLYMOUTH LOCOMOTIVES

GASOLINE, DIESEL, AND DIESEL ELECTRIC

PLYMOUTH LOCOMOTIVE WORKS • Division of The Fate-Root-Heath Co., Plymouth, Ohio, U.S.A.

25,000 a day!

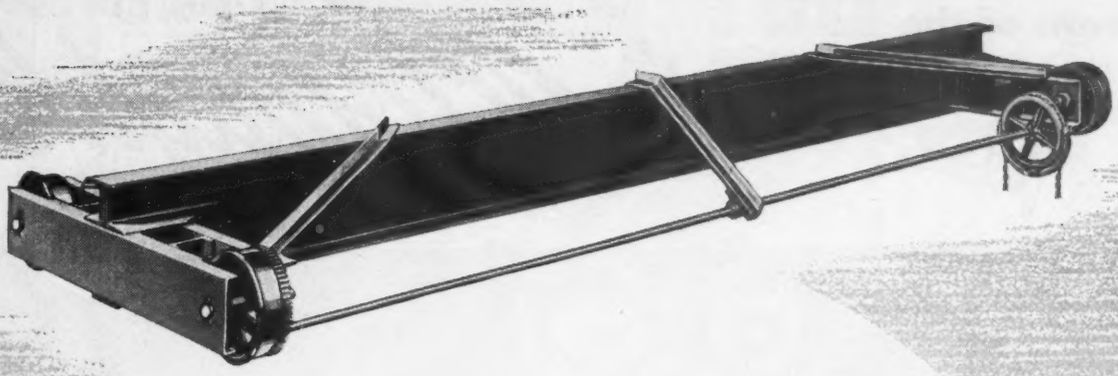
Tremendous increases are foreseen in travel by air in the postwar era. Airports that can handle 25,000 passengers a day may be needed. Aluminum and magnesium will play a vital part in postwar aircraft and other products. Bohn engineers will be at your service in designing your products for use of these modern light alloys.

BOHN ALUMINUM AND BRASS CORPORATION
GENERAL OFFICES—LAFAYETTE BUILDING • DETROIT 26, MICHIGAN
Designers and Fabricators
ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT-TYPE BEARINGS

BOHN

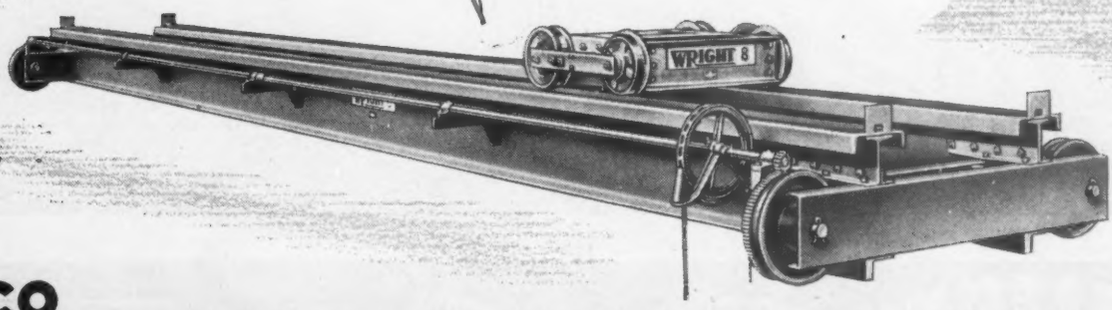
BUY WAR BONDS

WRIGHT CRANES



THINK what an overhead traveling crane, with a WRIGHT HOIST and TROLLEY, could do—when it comes to moving machinery around, or in and out, in that reconversion job that is just ahead. A WRIGHT TRAVELING CRANE would really put your ceiling to work, and speed up not only reconversion but subsequent civilian goods production as well. The WRIGHT combination of crane and hoist would help bring your production costs down to competitive levels.

WRIGHT material handling equipment (cranes, hoists and trolleys) is built in any desired capacity and to meet the most exacting specification. If your problem is special, ask local WRIGHT distributor (see metropolitan classified telephone directory) to call in a WRIGHT engineer. In the meantime, write for WRIGHT Specification Bulletin, or Catalog 12-D.



ACCO

York, Pa., Chicago, Denver, Los Angeles, San Francisco, Portland, New York, Bridgeport, Conn.

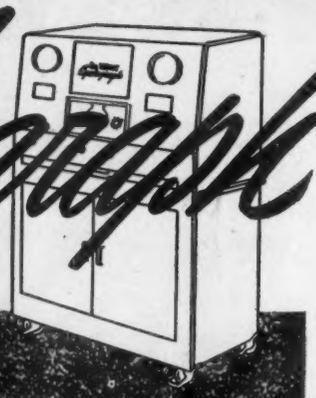
WRIGHT MANUFACTURING DIVISION
AMERICAN CHAIN & CABLE

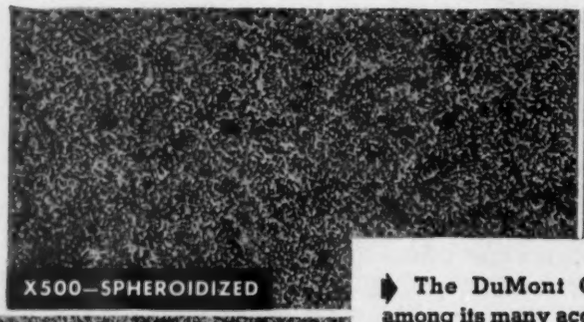
TRADE MARK

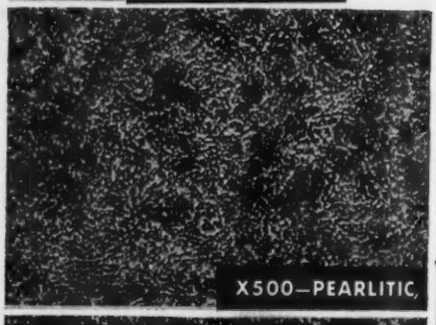
In Business for Your Safety

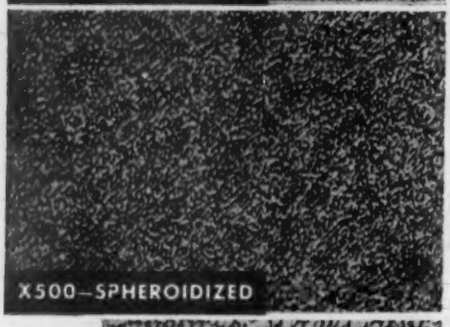
100% QUALITY INSPECTION

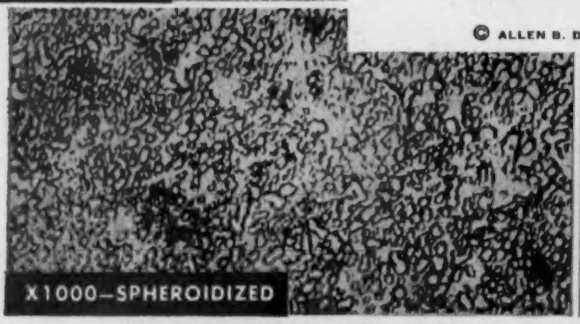
by means of the DuMONT Cyclograph

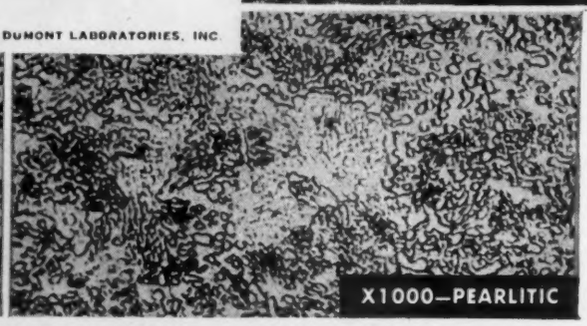












The DuMont Cyclograph lists among its many accomplishments *the instantaneous detection of variations in structure*. The Cyclograph quickly inspected 4500 bars of ⅜" 52100 steel. Pearlitic portions were revealed both electronically and visually by cathode-ray tube and by warning light. Full bars salvaged, and acceptable (spheroidized) portions, were marked with paint and subsequently reclaimed. Ordinary plant personnel performed the entire job in 16 hours.

The Cyclograph may be the answer to your most pressing metallurgical problem. Whether *ferrous* or *non-ferrous*—if yours is a problem of analysis, case depth, plating or cladding thickness, or the like, submit it to us for opinion.

Write for Literature

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DUMONT *Precision Electronics & Television*

ALLEN B. DUMONT LABORATORIES, INC., PASSAIC, NEW JERSEY • CABLE ADDRESS: WESPEXLIN, NEW YORK

IN CANADA: CYCLOGRAPH SERVICES, LTD. 12 JORDAN ST., TORONTO, ONTARIO.

Special BENDING Machine

Designed and Built for "Out-of-the-Ordinary" Jobs!

This four point bending roll combines in its design *hydraulic* pressing mechanism with a *mechanical* drive. It is another striking example of BIRDSBORO'S ability to design and produce heavy machinery to meet "out-of-the-ordinary" requirements. Birdsboro's engineers will be glad to help you solve your problems whether they call for standard or special machines. Get in touch with us today.

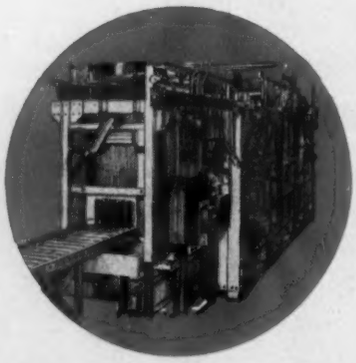
BIRDSBORO STEEL FOUNDRY & MACHINE COMPANY
BIRDSBORO, PA.

BIRDSBORO
HYDRAULIC PRESSES

THERE IS NO SUBSTITUTE FOR

EXPERIENCE

Heat treatment and its relation to metallurgy is not an exact science. Nor is furnace design. There are no tables or formulae that the intelligent engineer can use and come up with the right answer when it involves heat treating furnaces. There may be, X years hence, but not yet.



Thirty years of experience has given Holcroft engineers the answers that are not found in text books. If you want economical heat treating, talk to a Holcroft engineer.

BUILT BY HOLCROFT & COMPANY DETROIT-MICH.

HOLCROFT & COMPANY

6545 EPWORTH BLVD. DETROIT 10, MICHIGAN

CHICAGO—C. H. Martin, 1355 Peoples Gas Bldg.
CANADA—Walker Metal Products, Ltd., Walkerville, Ont.

WHY ARE CONNECTING RODS *Always Forgings?*

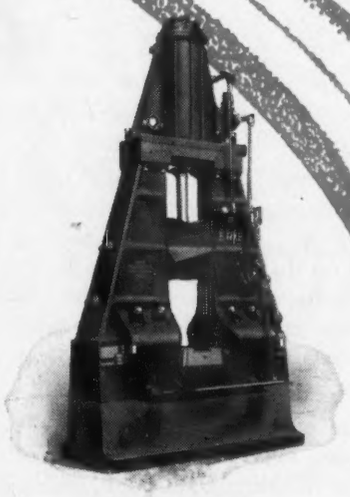
1 ***FORGING ASSURES uniformity in weight . . . is the basis for perfect balance when rods are assembled in the engine.***

2 ***FORGING DEVELOPS the toughness necessary to resist impact, torsion, whip, bend and fatigue.***

3 ***FORGING PERMITS control of metal fibres to direction the fibre structure so that greatest strength meets greatest stress in service.***

4 ***MINIMUM WEIGHT to avoid excessive counter balancing means stresses that can be carried safely only by forging.***

HUNDREDS of Erie Steam Drop Hammers are producing connecting rods for war engines today . . . will produce them for the pursuits of peace tomorrow. Erie Steam Hammers are built in rated sizes from 400 lbs. to 75,000 lbs. . . built in a thoroughly modern plant by experienced craftsmen with 40 years of "know how" to draw upon in meeting your hammer needs. Bulletin 340 gives you an accurate picture of this plant and its products. Write for your copy today.



ARMY E NAVY

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ERIE FOUNDRY COMPANY • ERIE, PA., U. S. A.

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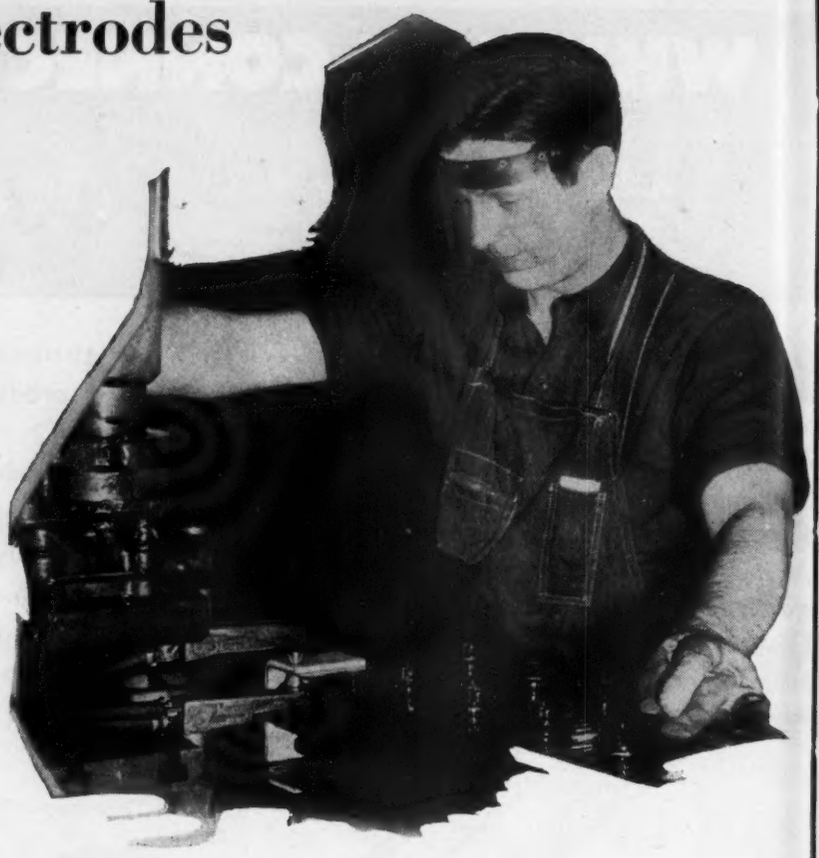

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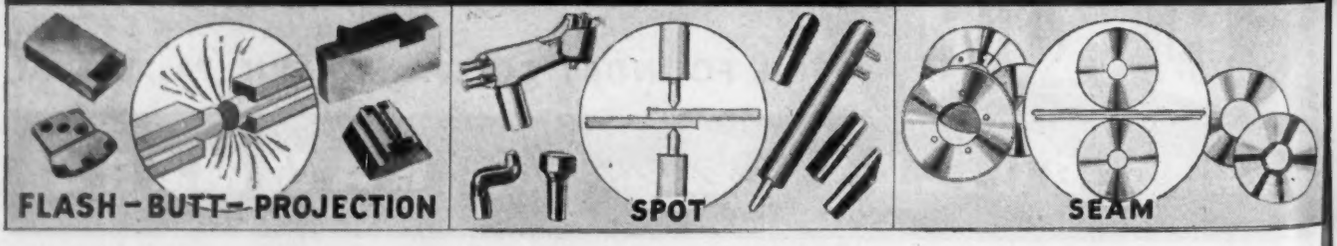

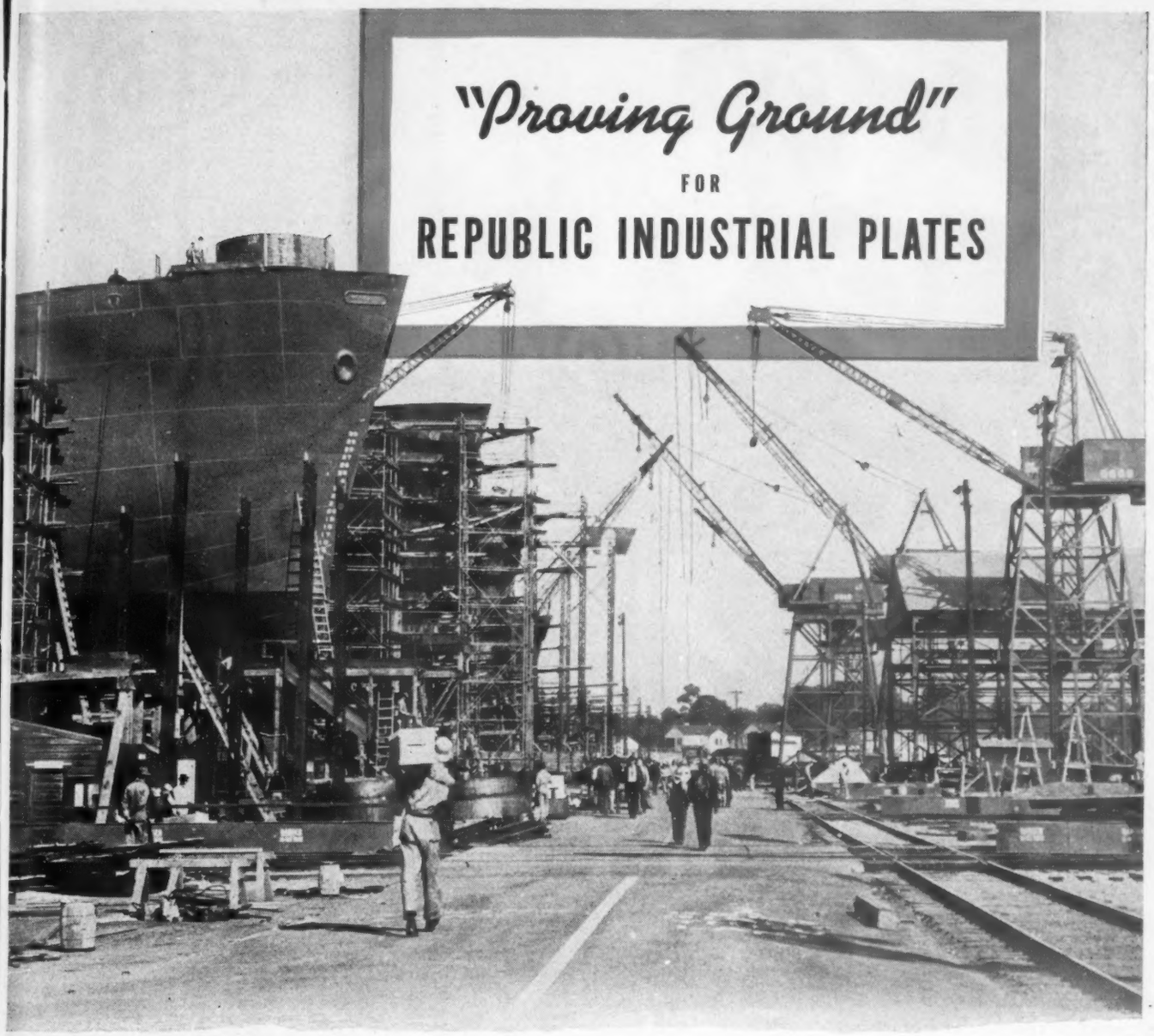

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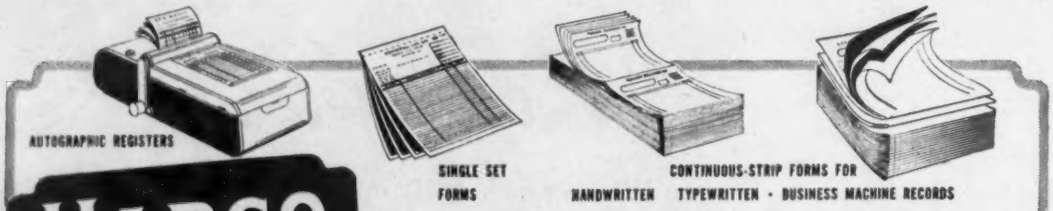
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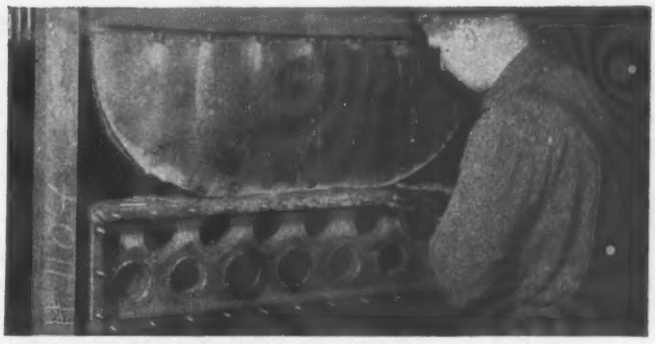

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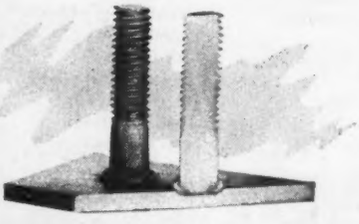

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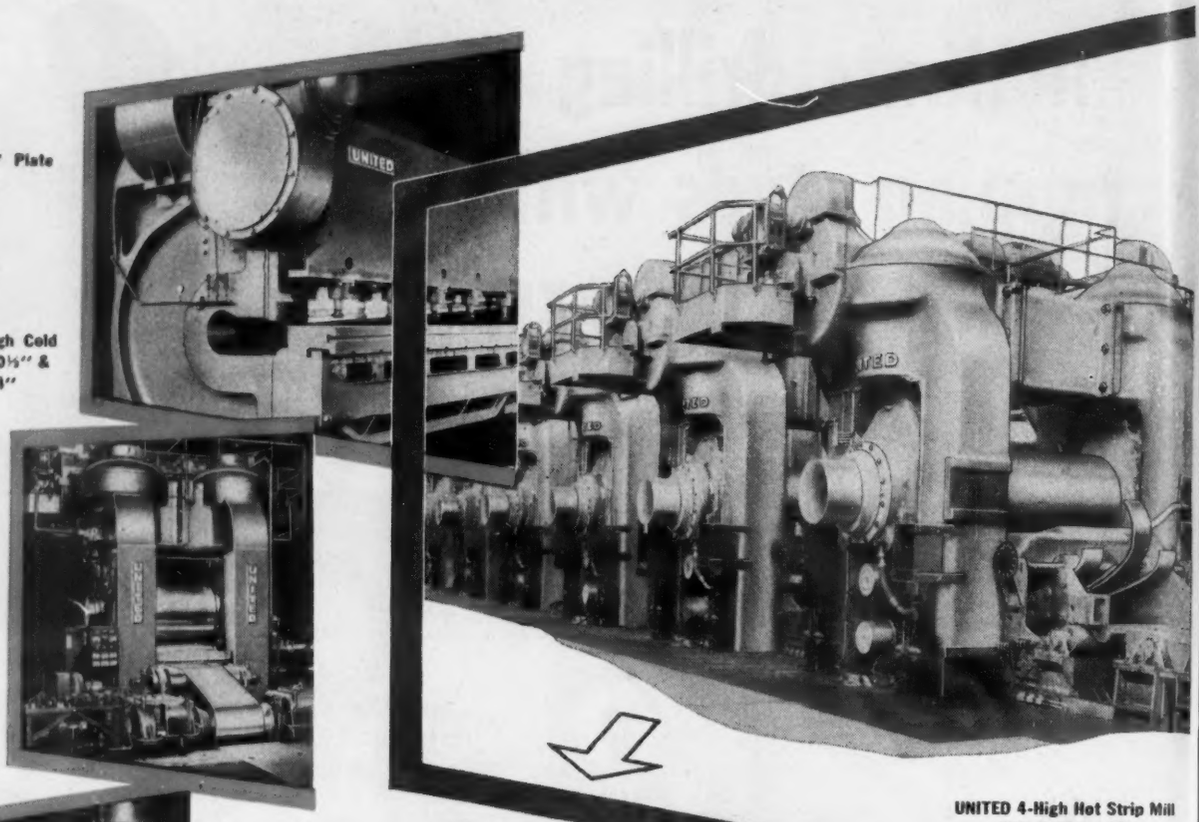

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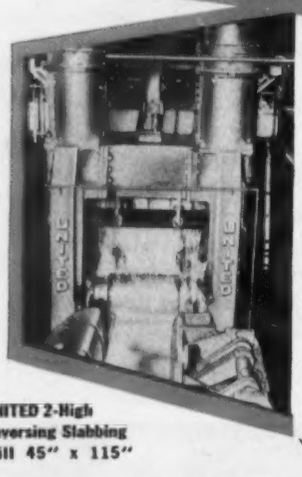

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STEEL

The Magazine of Metalworking and Metalproducing

Vol. 116. NO. 22 May 28, 1945

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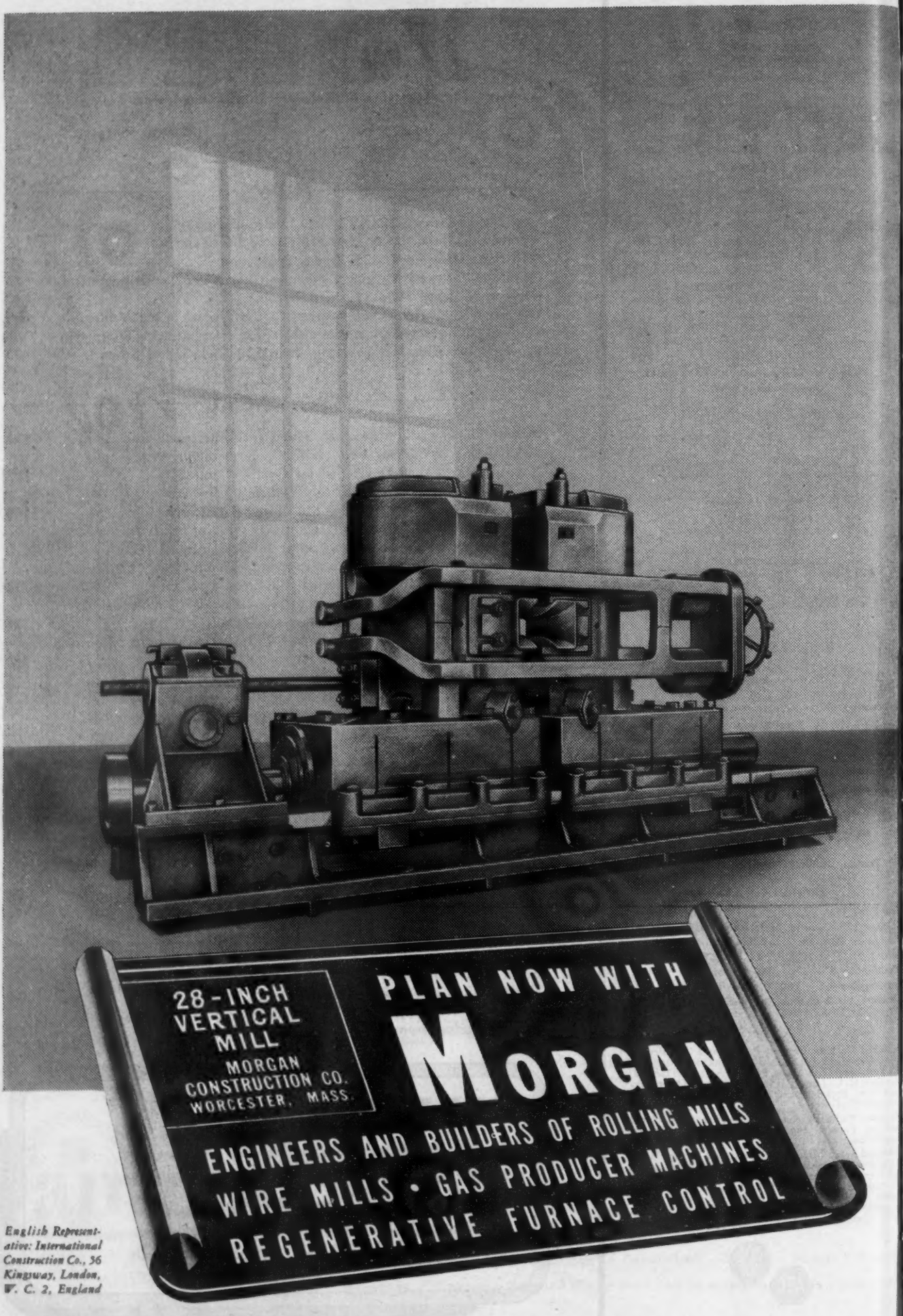


English Representative: International Construction Co., 56 Kingsway, London, W. C. 2, England

STEEL
May 28, 1945

Four Resignations

Last Wednesday was a day of important resignations. They are significant in that they bear upon the kind of government that will prevail in the two great democratic nations of the world during the transitional and postwar periods.

In Britain Prime Minister Winston Churchill tendered his resignation to King George VI, who immediately asked him to form a "caretaker" government to serve until after the elections, scheduled for early July. The resignation was precipitated by the refusal of the Labor party to accept Mr. Churchill's proposal that the coalition government be continued until after Japan's defeat. Now a rough and ready political contest is promised, with the Laborites campaigning on a platform of nationalizing Britain's utilities and heavy industries. Informed observers predict that barring unforeseen events Churchill's Conservative party will be re-elected, but with a smaller majority.

In the United States, President Truman accepted the resignations of Secretary of Labor Frances Perkins, Attorney General Francis Biddle and Secretary of Agriculture Claude R. Wickard. He named as their successors Federal Judge Lewis B. Schwellenbach, former senator from Washington; Assistant Attorney General Tom C. Clark of Texas; and Representative Clinton P. Anderson of New Mexico.

The significance of this shake-up lies not so much in the political complexion of the appointees as in their abilities to strengthen the cabinet. From the standpoint of their avowed political beliefs there is little to choose between the incoming and outgoing cabinet members; all six have been fairly consistent supporters of New Deal policies. The chief differences are in their fitness for and their attitudes toward their jobs.

Madame Perkins, perhaps reluctantly, permitted the Department of Labor to become a virtual nonenity. It is certain that her successor would not have given up a federal judgeship unless he had been assured by President Truman that he will have a free hand to resurrect the department and to incorporate in it the dozens of labor agencies which should have been in it these last dozen years. The new attorney general can be expected to bring a new sense of fairness to the office. Anderson, already familiar with the food problem, promises to wake the Department of Agriculture from its long sleep. Almost immediately the War Food Administration will be merged with the department and as time goes on other agencies will be placed under its wing.

These changes are encouraging steps in the right direction. They represent progress in the escape from the danger of top-heavy government.

ABILITY TO "ABSORB": Apparently nobody is satisfied with the price increases on 14 steel products announced Monday by OPA. Producers, while thankful for small favors, are keenly disappointed because the increases fall far short of compensating for increased costs already incurred. Non-integrated mills and the manufacturers of cold drawn bars, bolts and nuts, fabricated plate products, tubing and containers have a right to be critical because the new schedules increase their costs and they cannot pass these increases along to their customers. Steel warehouses have a similar complaint, inasmuch as they must absorb the increases on 11 of the items involved.

This arbitrary ruling is based upon the much-publicized OPA policy that increased costs at any stage of manufacture cannot be passed down the line if anybody in the chain of processors and distributors can "absorb" them without undue hardship. This "ability to absorb" factor seems to be a fetish with OPA. The agency is punishing the warehouses because it feels they have not supplied sufficient information regarding their "ability to absorb."

One can make allowances for drastic, arbitrary

(OVER)

action by government agencies in time of war, but God help America if ability or inability to absorb handicaps and to present a good sob story becomes the basis of government price rulings in peacetime!
—pp. 73, 75

• • •

ECONOMIC CHANGES: Action of the Interstate Commerce Commission in lowering class freight rates 10 per cent in the South and West and raising them 10 per cent in the East will cause confusion to many shippers. The rates are temporary, to be effective from Aug. 30 until a uniform rate classification system can be prepared. They affect manufactured and miscellaneous goods constituting about 4 per cent of freight shipments and 6 per cent of railroad revenue.

How much the ruling was influenced by political pressure and how much by economic conditions is difficult to determine. ICC states its decision was based upon "considerations of cost of services, consists of the traffic, distribution of the rate burden and other factors usually given weight in determining lawful rates." It also mentions "changes in the economic pattern of the country."

If the economic changes are as marked as ICC thinks they are, manufacturers will feel their impact in various ways besides freight rates. —p. 81

• • •

CONVERSION PROBLEMS: WPB presents interesting data on the estimated volume of peacetime production in 72 industries and the construction and equipment needs of some of these industries to permit full-scale conversion to civilian production. The figures merit careful study.

For instance, the current production of the 72 industries is at the rate of $3.5 billion quarterly. It is estimated that the minimum or breakeven rate of production on a peacetime basis will be $1.3 billion per quarter. The full-capacity rate of production on a peacetime basis is set at $2.5 billion per quarter.

However, few of the individual industries conform to this overall pattern. Estimated capacity peacetime output of automobiles, for example, is about half of the industry's wartime production, whereas the estimated peacetime capacity production of typewriters is 171 per cent of the wartime output of this industry.

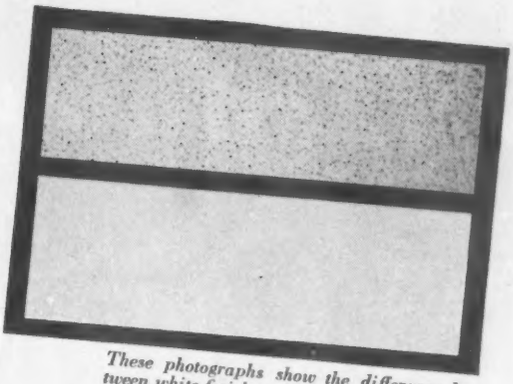
Study of these figures indicates that the problems of adjustment to peace in various industries will vary widely. —p. 76

SIGNS OF THE TIMES: Lt. Gen. Levin H. Campbell Jr., chief of ordnance, says that demands for ordnance in the Pacific will continue to place emphasis on lighter equipment. The distances involved, type of fighting and other factors (p. 79) indicate a tightness in sheet markets for shipping containers and drums and a need for an increasing volume of rockets, bombs and mortar shell. . . . Speakers at a forum on "American Business in a Planned World" warn that the use of treaty-making powers to override constitutional limitations (p. 80) could set the stage for transforming the American system into national socialism. . . . A perforated strip of paper fed into a piano player will reproduce music. Similarly, by a new process which employs electronics (p. 102), a plastic record can be "played back" on a flame cutting machine to guide the cutting torch through intricate contour work. . . . Demand for postwar construction is mounting. F. W. Dodge Corp. reports that 90,700 specific projects involving expenditures of $14.8 billion (p. 156) are being contemplated for postwar execution in 37 eastern states. . . . WPB has allotted 1,339,588 tons of carbon steel for transportation needs in the third quarter. This covers 87 per cent of ODT requirements (p. 86) and involves rails, and steel for locomotives, freight and passenger cars and track accessories. . . . The spokesman of a California employers group declares that "if workers and employers are to get a fair deal (p. 95), the government must do one of two things. If more war material is to be produced, let us have contracts fast. If more material is not wanted, let the government stop strangling us with red tape and let us reconvert to civilian work". . . . Four western aircraft manufacturers put up $2,500,000 to construct a co-operative wind tunnel (p. 98), requiring 1500 tons of steel and permitting tests with wind velocities up to more than 700 miles per hour. . . . Congratulations to Oliver E. Mount, Claude L. Harrell and Edwin A. Walcher for honors awarded by the Steel Founders Society of America (p. 100) for outstanding contributions to the steel casting industry in 1944. . . . Navy men reported to the American Gear Manufacturers Association that progress made in developing the carbide hobbing of marine propulsion gears (p. 79) has helped to break a serious bottleneck in the shipbuilding program.

E. L. Shaner

EDITOR-IN-CHIEF

WHAT INLAND TI-NAMEL WILL DO FOR YOU



These photographs show the difference between white finish coat applied directly to the base metal and fired on ordinary enameling stock (above) and Inland Ti-Namel (below).

Hunter Nead (right) manager, and Frank Porter, ceramic engineer, both of Inland's Metallurgical and Inspection Department, check the fine quality of a single coat of enamel on a Ti-Namel panel.

This deep drawn part, 8 inches in diameter by 7½ inches deep, was made from 18-gage Ti-Namel Steel and then given one coat of white enamel.

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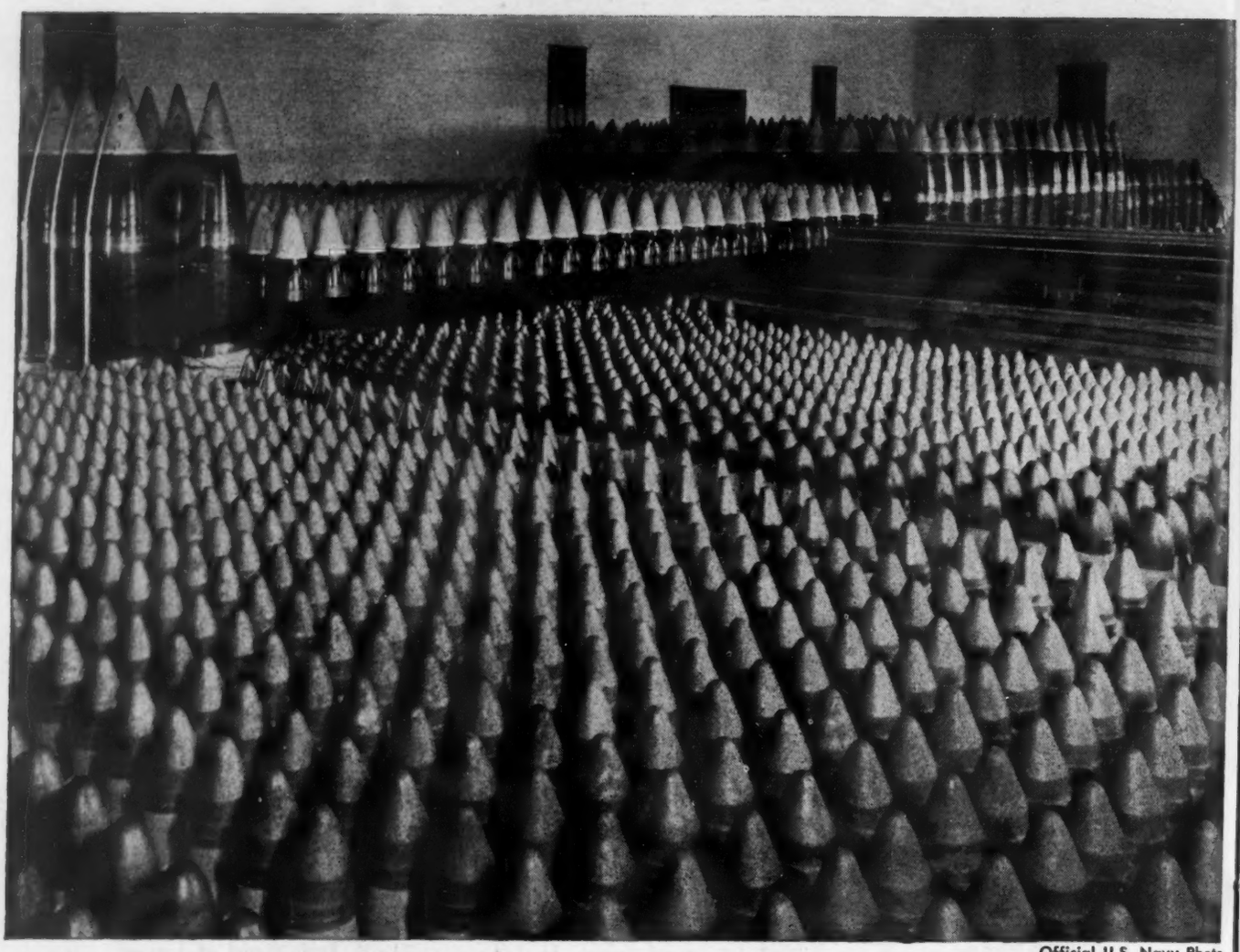
Principal Products: Bars, Floor Plate, Piling, Plates, Rails, Reinforcing Bars, Sheets, Strip, Structurals, Tin Plate, Track Accessories.

INLAND TI-NAMEL



Official U.S. Navy Photo

PRECISION...MASS PRODUCED

IN THE first 30 months of the war, the U. S. Navy alone fired more than 41,000 tons of projectiles at the enemy! Each of these projectiles — from machine-gun bullets to giant 16-inch shells — had to be finished to the most precise tolerances for safety and accuracy in firing.

Because ammunition is needed in such vast quantities, machining must be fast as well as accurate. Texaco Cutting and Soluble Oils not only assure faster machining, but better finish and longer tool life as well. That is why they are the choice of experienced machine tool operators everywhere.

Texaco cutting fluids cool and lubricate the tools, carry away heat and prevent chip welding, thus lengthening tool life, assuring greater output.

The services of a Texaco Engineer specializing in cutting coolants are available through more than 2300 Texaco distributing plants in the 48 States. Get in touch with the nearest one, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

RECONVERSION RUSTPROOFING

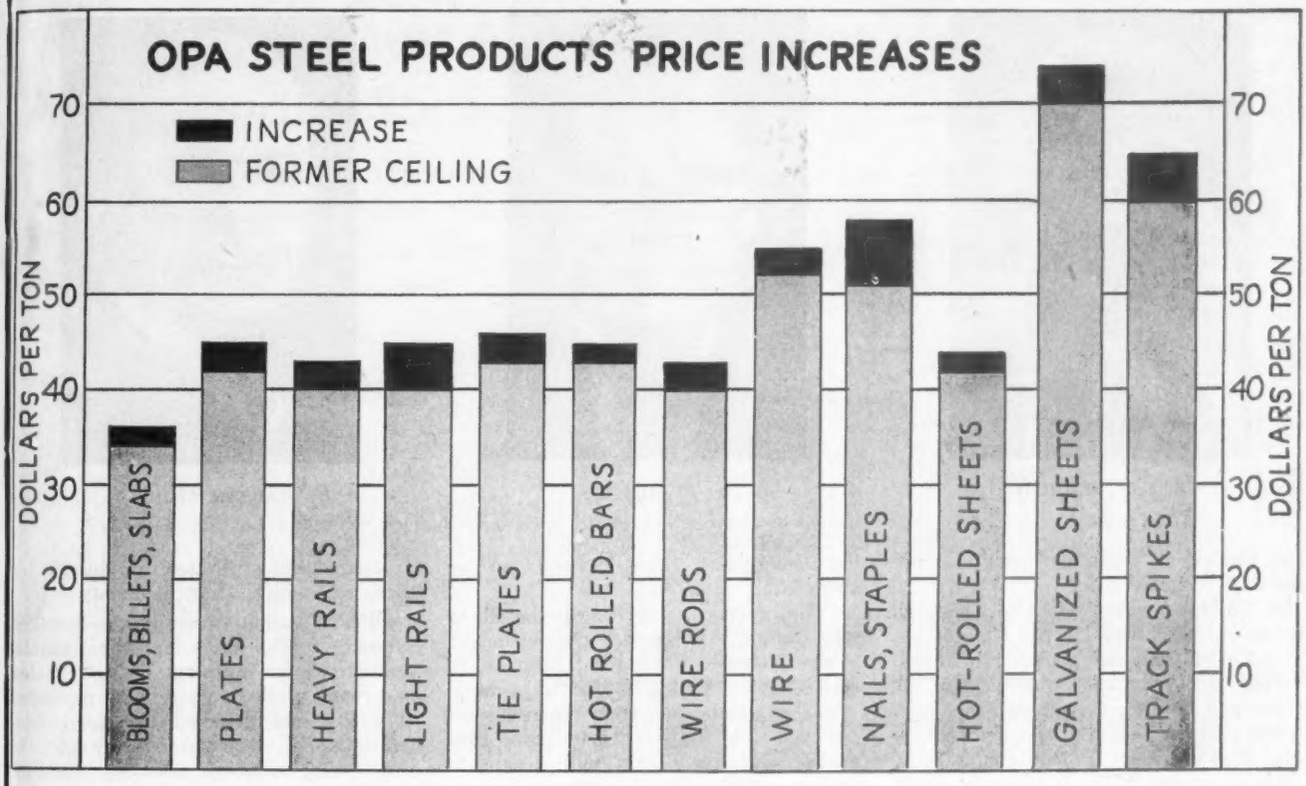
5 Points to Remember

1. Upon termination of war contracts, Government-owned production equipment must be rustproofed promptly, in accordance with *official instructions.*
2. Ordnance Specification P.S. 300-4 contains *official instructions* for the complete processing of such equipment.
3. These instructions require that only rustproofing materials meeting Government specifications be used.
4. *Texaco rustproofing products meet Ordnance specifications for application on Government-owned equipment.*
5. For full information, see your Texaco representative or write to us.

TEXACO

TEXACO CUTTING, SOLUBLE AND HYDRAULIC OILS FOR FASTER MACHINING

TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON EVERY SUNDAY NIGHT — CBS



OPA Increases of $2 to $7 Are Held Inadequate To Offset Higher Costs

Advances will amount to less than 2 per cent on all products. Claimed to be insufficient to eliminate out-of-pocket losses on basic items. Appeals for further relief will be filed by producers with appropriate government agencies

PRICE increases ranging from $2 to $7 a ton on 14 basic steel products, granted by the Office of Price Administration last week, are being assailed as wholly inadequate to compensate for the heavy increases in labor, materials and other costs imposed on the industry since price controls first were instituted.

For some companies the increases will be insufficient to meet serious losses now being suffered, industry spokesmen contend.

For the industry as a whole, the higher prices will amount to less than 2 per cent on all products.

A reliable estimate of the aggregate increase in the industry's revenues that will result from the higher prices is difficult due to important changes in product mix that will accompany reconversion. However, it may be figured that had the higher prices been in effect during 1944, the industry's sales would have been increased about $90 million, hardly enough to offset the recent fringe wage increase ordered by the War Labor Board. Realization of any such increase in the future is unlikely, as many of the more profitable war contracts are being reduced or canceled.

Steel warehouses, which normally distribute about 15 per cent of steel products, are dealt a severe body blow by the OPA action. While they must pay higher prices to the mills, they are prohibited from passing these increases along to their customers on any but merchant products. On most products, the distributors will be forced to absorb the increase.

In addition to the warehouses various other consuming lines will have to absorb the mill increases under the present arrangement. These include the small non-integrated mills which purchase semi-finished steel from the larger producers, plate fabricators, cold bar finishers, tubing manufacturers, container makers and bolt and nut producers.

Appeals from the OPA action were being prepared by various segments of the industry last week. These may go to OPA, to the Emergency Court of Appeals and to Congress.

The price increases are contained in amendment 13 to revised price schedule 6 and are as follows:

1. Carbon steel blooms, billets, slabs and sheet bar, all qualities—$2 per gross ton.

2. Carbon steel tube rounds, and tube billets exclusive of billets not directly converted into seamless pipe or tube—$4 per gross ton.

3. Carbon steel plates, all types and qualities, produced to the dimensional tolerances in AISI Manual Section 6, Carbon Steel Plates, March, 1943, revision—15c per 100 pounds.

4. Rails, except light rails, all types and grades—$3 per gross ton.

5. Light rails, all types and grades—$5 per gross ton.

6. Tie plates, all types—$3 per net ton.

7. Carbon steel hot-rolled bars and bar

ROBERT WOLCOTT

R. K. CLIFFORD

LAUSON STONE

size shapes, all types and qualities—10c per 100 pounds.

8. Carbon steel hot-rolled wire rods, all types and qualities—15c per 100 pounds.

9. Carbon steel manufacturers wire and carbon steel merchant quality wire, all types and finishes, except such manufacturers wire for which a base price in excess of $3.20 f.o.b. Pittsburgh, or $3.30 f.o.b. Worcester, Mass., is otherwise established by the schedule—15c per 100 pounds.

10. Nails and staples, other than galvanized nails and staples—35c per 100 pounds, except that for all miscellaneous nails and wire brads having the maximum prices based on list prices less published discounts, the increase of 35c per 100 pounds may be added to the maximum delivered prices.

11. Twisted barbless wire and barbed wire—10c per 100 pounds.

12. Bale ties, all types—35c per 100 pounds.

13. Hot-rolled carbon steel, porcelain enameling, iron and electrical steel sheets, including roofing and siding manufactured from those materials, all types and qualities—10c per 100 pounds.

14. Galvanized iron and steel sheets, and zinc coated specialty iron and steel sheets, including roofing and siding manufactured from those materials (not including galvannealed sheets)—20c per 100 pounds.

15. Track spikes—25c per 100 pounds.

First Advance Since 1941 on Some

On five products, hot-rolled sheet, plates, galvanized sheet, rails, nails and staples, the increases replace the interim price increases of $2 to $5 a ton authorized Jan. 11. On the remainder, the ceiling price increases are the first since 1941, or before price control began.

The increases (predicted in STEEL, May 14, p. 216) are effective May 23. They are designed to permit producers to recover some of the increases in production costs experienced since 1941 and are the minimum increases required by law on a "product standard" basis under the Emergency Price Control act as amended.

"The prices are necessarily based to some extent," OPA said, "upon estimates of cost increases. Studies will be made to review these estimates and determine, so far as practicable, from operating experience what the actual increase in production costs have been, with a view to further adjustments if necessary."

Throughout the war years there has been a steady increase in the cost of producing steel as the result of sharp advances in wage rates and the necessity for paying overtime rates on a large scale, advances in raw materials such as coal and iron ore, a general deterioration in the quality of scrap, increased use of pig iron, increases in the cost of fuel oil, refractory and other miscellaneous supplies and equipment, in addition to increased labor turnover and decreased labor efficiency.

Many Economies Realized

Working against these increases in costs were the economies resulting from high operations and the higher prices realized on special war products.

However, as costs continued to increase the profit on basic steel products vanished, and many bread and butter items of the industry were produced at losses ranging up to $9 a ton. The industry as a whole was able to stay in the black only because a substantial part of its output consisted of premium-priced war goods and because operations were at practical capacity.

Even so, the industry's earnings have been diminishing steadily since 1941 and with the advent of reconversion and a shift to the production of basic carbon steels, the industry faced the bleak prospect of operating at a high rate of capacity at a loss.

The earnings outlook was further darkened by the War Labor Board's granting certain fringe wage increases last November. These were made retroactive to about the beginning of 1944 and added probably $90 million to the industry's wage bill. The price increase does nothing to compensate the steel producers for these retroactive wage payments.

OPA at various times has undertaken surveys of steel costs and the financial position of the industry. These revealed that many products were being produced at a loss and depicted the steady deterioration of steel earnings through the war years, although showing the industry's return through the third quarter of 1944 as comparing favorably with the 4-year period of 1936 through 1939.

On the basis of its latest financial information, OPA pictures the position of 21 producers accounting for 85 per cent of carbon steel production as follows:

Period	Net profit before income taxes: As per cent of net worth	Net profit before income taxes: As per cent of sales
1936-39	* 4.2	* 4.5
1940	8.0	6.7
1941	20.8	12.3
1942	19.7	11.0
1943	12.1	6.6
1944:		
First quarter	†10.4	5.6
Second quarter	† 9.1	4.9
Third quarter	† 8.4	4.5

* 1938 was a loss year and is in the average as zero.

† On an annual basis, and before any provision for wage increases to steel workers and coal miners granted in December 1944, and May 1945, respectively.

On these figures, OPA held the overall earning position of the industry was better than in the base period and that its "industry earnings" standard was satisfied. However, under the "product standard" the agency was bound to compensate producers for their out-of-pocket losses.

In granting the increases, OPA left the door open for further adjustments, upward or downward, and producers last week indicated they would press for more equitable increases.

A committee of nonintegrated producers, comprising Lauson Stone, Follansbee Steel Corp., Pittsburgh, Robert Wolcott, president, Lukens Steel Co., Coatesville, Pa., and R. K. Clifford, vice president, Continental Steel Corp., Kokomo,

(*Please turn to Page* 182)

Warehouses Must Absorb Increases Amounting to $6, $7 Million Yearly

Distributors, caught in squeeze play, can pass on to customers only the advances on merchant products. OPA irked by failure to obtain operating cost data from jobbers. Action held "arbitrary and high-handed"

STEEL warehouses, which normally distribute about 15 per cent of steel products, are caught in a "squeeze play" in OPA's most recent price action.

The distributors will pay the mills $2 to $7 more per ton for 14 standard steel products but will be permitted to pass these increases on to their customers only on merchant products. On all others the warehouses must absorb the increase. The warehouses will not even be permitted to pass on the "interim" increases of $2 to $5 a ton on plates, hot-rolled sheets, galvanized sheets and rails which they were permitted to include in their selling prices from March 1 to May 23.

The OPA ruling affecting warehouses was interpreted as a punitive action against the distributors who, OPA contends, have been reluctant to submit their operating cost data to the price agency. It is an extension of the position of the OPA taken in January when it allowed the steel producers interim increases on certain products, effective Jan. 11, but forced the warehouses to absorb these interim increases until March 1. It is estimated this interim absorption by the warehouses amounted to in excess of $700,000. Now, with even the interim increases wiped out, the warehouses are faced with absorption of from $6 million to $7 million in increased costs on an annual basis.

"The absorptions are being required," OPA said, "because limited information made available to OPA does not indicate that price increases are required or that absorption will increase hardship for the intermediate sellers as a group.

Filing of Cost Data Lags

"Some of the operating cost data sought by OPA was asked for in August, 1944, some of it in January, 1945, and some of it in March, 1945. To date, however, only a few firms have supplied such information to OPA, as requested."

Effective May 23, the warehouses may pass on the following: Mill price increase of 35c per 100 pounds for bright nails and staples; increase of 20c per 100 pounds for painted roofing and siding; increase of 15c per 100 pounds for carbon merchant quality wire; increase of 10c per 100 pounds for twisted barbless and barbed wire; increase of 35c per 100 pounds for bale ties.

Warehouses must absorb: Mill price increase of 15c per 100 pounds for carbon steel plates; $3 per gross ton for heavy rails and $5 per gross ton for light rails; 10c per 100 pounds for hot-rolled carbon sheets; 20c per 100 pounds for galvanized iron and steel sheets and zinc-coated sheets; $2 per gross ton for carbon steel blooms, billets, slabs and sheet bar; $4 per gross ton for carbon steel tube rounds and tube billets, exclusive of billets not directly converted into seamless pipe or tube; $3 per net ton for tie plates; 10c per 100 pounds for carbon hot-rolled bars and bar size shapes; 15c per 100 pounds for carbon hot-rolled wire rods; 15c per 100 pounds for carbon steel manufacturers wire; 25c per 100 pounds for track spikes.

OPA's action, contained in amendment 31 to price schedule 49, is believed by distributors to be "high-handed and arbitrary." Warehouses have been subject to many of cost increases, particularly for labor and truck transportation.

That appeal for relief will be made by the distributors to the appropriate government authorities appears certain.

Several warehouse companies last week were preparing protests to congressmen in the districts in which they operate, including considerable financial data. One company's profits on sales dropped from 8.7 per cent during the base period 1936-39 to 3.2 per cent during 1944.

Present, Past and Pending

■ STEEL INSTITUTE OFFICERS, DIRECTORS RE-ELECTED

NEW YORK—Re-election of all officers and nine members of the board of directors, and election of two new board members to fill vacancies was announced last week by the American Iron & Steel Institute. New additions to the board are: W. P Snyder Jr., chairman, Crucible Steel Co. of America, and Charles M. White, president, Republic Steel Corp., the former succeeding F. B. Hufnagel and the latter T. M. Girdler.

■ WPB AUTHORIZES PASSENGER CAR PRODUCTION

DETROIT—WPB announced last Thursday amendment of order L-2-g to permit manufacture of 214,678 passenger automobiles over the remainder of 1945, providing manufacturers can obtain materials. No priority assistance is being extended on materials. This action is seen as the "green light" to go ahead on auto production.

■ GOVERNMENT AND STEEL FIRMS NEGOTIATING SETTLEMENTS

WASHINGTON—War and Navy departments have launched a campaign to negotiate pretermination settlement with 19 leading integrated steel companies.

■ PULLMAN'S MAJOR ARTILLERY CONTRACTS CANCELED

CHICAGO—Termination of major artillery contracts amounting to $14 million at Pullman Standard Car Mfg. Co's, Hammond Works, Hammond, Ind., was announced last week. Cancellations of contracts do not mean a letup in production of large shells for the Navy and do not affect $3 million in existing contracts for artillery spare parts.

■ GERMANY MAY MAKE 5 MILLION TONS OF STEEL YEARLY

WASHINGTON—Foreign Economic Administration will allow Germany to make 5 million tons of steel ingots a year, according to reliable reports here.

■ FELLOWS, GEAR MANUFACTURING EQUIPMENT MAKER, DIES

SPRINGFIELD, VT.—Edwin R. Fellows, 80, president and founder, Fellows Gear Shaper Co., this city, died May 22. He held 35 patents on gear manufacturing equipment.

■ BATCHELLER RETURNS FROM WPB TO ALLEGHENY LUDLUM

WASHINGTON—Hiland G. Batcheller, chief of operations and at one time chief of the Steel Division, War Production Board, has resigned and returned to his company, Allegheny Ludlum Steel Corp., Brackenridge, Pa.

■ IRON AND STEEL BAN LIFTED ON 24 HOUSEHOLD ITEMS

WASHINGTON—Restrictions on use of iron and steel to make 24 household articles have been removed through revocation of order L-30-d. Production of these items now will be limited by availability of materials, facilities and manpower.

■ MACHINE TOOL MAKERS HAVE SEVEN-MONTHS BACKLOG

WASHINGTON—Machine tool shipments in April held steady at $40,331,000 while unfilled orders dropped 7 per cent from March to $287,920,000, a seven-months backlog.

Switch to Civilian Goods Starts

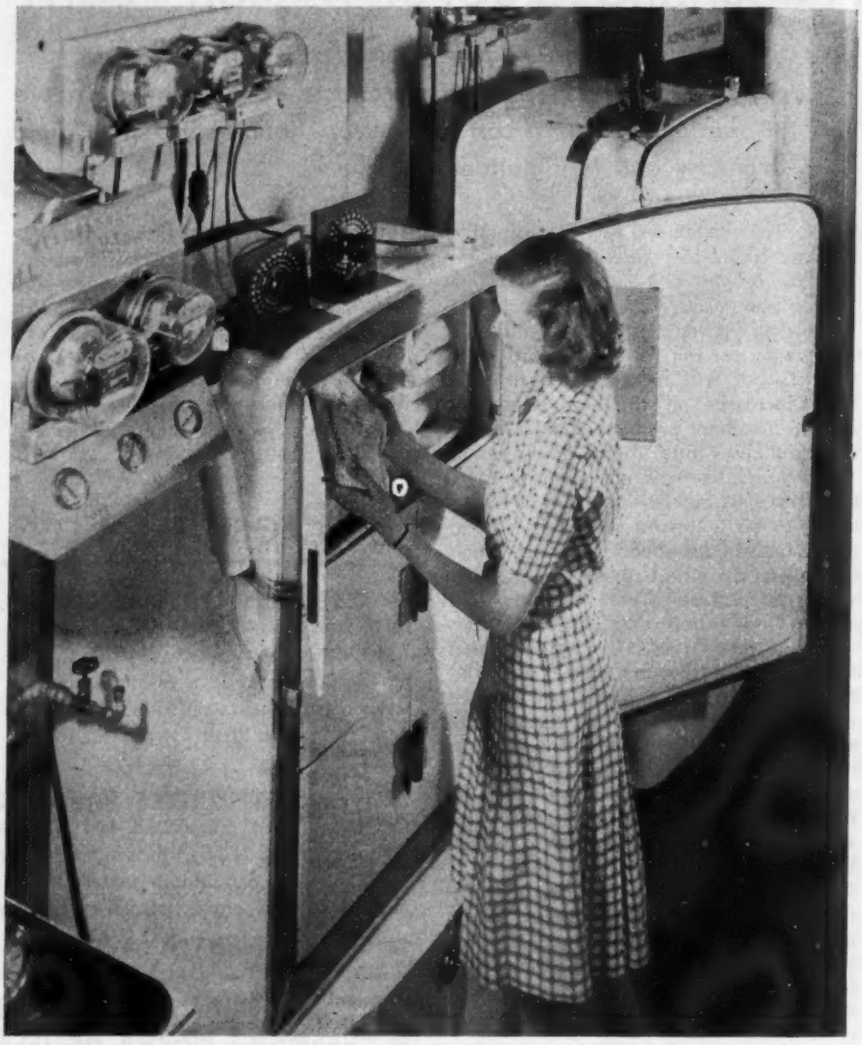
Preliminary phase of transition gains momentum but full start on peacetime goods awaits improved raw material supply

RECONVERSION to civilian goods production is under way—but slowly.

While the government is laying the foundation stones for as orderly a shift as possible, rough spots and conflicts are appearing in the program. These will have to be overcome before impressive progress can be expected.

Requirements for the Pacific war remain to be definitely determined. Shifting from a two-front to a one-front war has resulted in procurement complications which will take some time to iron out. Generally, however, it is believed the Army's needs will be pretty well sized up within the next six weeks.

Although the strings of government control on production have been loosened since V-E Day, the fact remains that key regulations still remaining in effect are effectively barring any significant resumption of civilian production. Since just before V-E Day well over 100 control orders have been removed. A week ago the War Production Board revoked controls on the manufacture of a wide range of civilian products, ranging from golf clubs to juke boxes, in one sweeping action removing restrictions on some 1200 of the most common civilian items through revoking its order officially designated as M-126. The simple fact is, however, that while many controls on civilian goods production have been removed practically no steel or other vital materials are available for such manufacture. As things now stand, manufacturers of peacetime goods will have to get along as best they can with such idle, surplus or secondhand steel as they can lay their hands on at least until July 1 when it is the announced intention of WPB to create an uncontrolled pool of steel, copper and aluminum for civilian use.



This new upright home freezer, which soon will be manufactured by Westinghouse Electric Corp., is a companion piece to the household refrigerator in size and finish, with front-opening door and sectional inner doors for reach-in convenience. Thermocouples, in effect miniature and highly sensitive thermometers, give a complete history of temperatures within the foods at all times

Heavy Demand for Machine Tools

Reconversion to peacetime production will mean an increase in demand for machine tools, according to WPB. Military cutbacks, it states, will be offset by mounting demands for tools necessary for production of civilian goods. Indications are this demand will continue for an indefinite period before slipping back to a prewar base.

Tools and construction, according to WPB officials, are the chief bottlenecks to resumption of civilian goods manufacture on a broad scale, although materials and components will present serious problems after the preliminary steps have been taken and industry is ready to begin turning out civilian goods.

The automotive industry's immediate need of approximately $50 million worth of machine tools is cited as an example of the type of help industry requires before it starts talking in terms of civilian output. The $50 million worth of tools, WPB states, covers only bottleneck equipment necessary for break-even output and does not include items that will be required when the industry is ready for all-out production.

WPB has given an AA-3 rating to machine tool orders in the preliminary reconversion program. Similar ratings are being given for reconversion construction. The AA-3 rating does not mean machine tools or other equipment necessarily will be forthcoming. It means only that such orders will get second rating to military requirements.

Steel mills are reported booked through second quarter on allocated war tonnage. However, it is understood some 500,000 tons of carbon steel will be freed for civilian production in third quarter, though it is said sheet steel, a major product in civilian goods, promises to continue in extremely tight supply. Also, other materials such as rubber, tin and lead will continue in short supply for the civilian goods market.

Indicative of the continued tight raw materials supply situation, WPB last week issued a list of 196 metals, minerals and materials which are expected to continue in short supply for some time. WPB

said that industry should understand the list is not complete, or hard and fast; that changes are unpredictable—requirements situation of other materials and products may alter the picture considerably over coming months.

From this it can be seen that the solution of the problem of the manufacturer with capacity open for civilian production must await the opening up of raw material supply to a much greater extent than at present. After July 1 it is indicated producers will have free access to metals as far as priorities go, but they will take second place behind war demands. Consequently it is difficult to say when a full start on civilian production will get under way.

Because of the competition that will exist for the restricted tonnage of raw materials expected to be made available for civilian goods production, WPB intends to keep an eye on inventories of the larger manufacturers and every effort will be made to aid small business interests to obtain needed supplies.

Study of the industries judged to be most seriously in need of preliminary reconversion help of a kind designed to prevent "bottlenecks" in return to peacetime production was released last week by WPB. All of the industries concerned, WPB said, have had an opportunity to discuss their reconversion problems with the industry division of WPB under which they operate. Discussion has, in many cases, materially reduced "breakeven" requirements. The automotive industry, for example, now finds that $29 million will cover its immediate construction needs rather than its original estimate of $35 million. Similarly, the mechanical refrigerator industry has been able to reduce its construction requirements from approximately $6 million to $1,290,000. Then, the nonjeweled clock and watch industry will need only $85,000 for construction at this time rather than its earlier estimated figure of $227,500.

Seventy-two Industries Surveyed

Seventy-two industries were surveyed, but not all 72 reported on all phases of the program. The studies reveal a wide variance in both needs and time required to get the wheels of peacetime production revolving, and the WPB in issuing the data, warned the studies are apt to change and that the actual time needed for reconversion will differ not only from industry to industry, but, in some cases, from plant to plant in the same industry. Detailed breakdown of these data are given in accompanying tables.

A particularly significant point developed by the study is that the 72 industries surveyed currently have a combined quarterly production of $3,561,529,000. Estimated peacetime production at the minimum or breakeven rate of quarterly production for these industries is placed at $1,318,261,000, while quarterly peacetime production on an all-out capacity basis is estimated at $2,507,006,000. If these figures are representative for all industry, it is clear the wartime level of peak employment can scarcely be looked for in peacetime when production at capacity is expected to be roughly about one-third under that of current war output.

Estimated War and Peacetime Production

Estimates made by many important industries as to the dollar value of their present production and the probable total of their peacetime production were announced by the War Production Board as follows:

Industry	Current Production Per Quarter	Contemplated Peacetime Production: Minimum or Break-Even Rate of Prod. Per Quarter	Contemplated Peacetime Production: "All-Out" or Capacity Rate of Prod. Per Quarter
Passenger automobiles	$2,152,500,000	$620,500,000	$1,127,400,000
Power cycles	3,096,000	633 000	2,168,000
Appliances, small electric	8 000,000	6,000,000	9,000 000
Band instruments	3 000,000	1,375 000	2,750,000
Bedding industry	25 000 000	25 000 000	62,500,000
Bicycles	11,222,000	5,271,000	10,255,000
Caskets and vaults, metal	6 000 000	3,750,000	7,500 000
Clocks and watches, jeweled	19 886 000	9,183 000	19 750 000
Clocks and watches, non-jeweled	16 553 000	9,717 000	12,008 000
Fans, electric	17,000,000	1,720,000	2 900,000
Flatware	8,000 000	4,975 000	9,950 000
Flashlight cases, metal	4,000,000	4,000,000	8,000 000
Furniture, metal household	28 000 000	4,950 000	15,000 000
Furniture, metal office	15,000 000	8,200,000	23 000 000
Furniture, wood	200,000 000	200 000,000	250 000 000
Fishing tackle and reels	6,000 000	2,500,000	5,000 000
Lamps, sealed beam	1 200 000	300 000	450,000
Laundry equipment, domestic	106,000 000	14,800,000	52 000,000
Lawn mowers, hand and power	6 000,000	3,882,000	5,546 000
Photographic equipment	45,000,000	21,795,000	31,450,000
Pianos	5,000,000	5,600 000	8,000,000
Ranges, electric, domestic	.....	4,400,000	11,000,000
Refrigerators, domestic, mechanical	141,225,000	30,589,000	93,251,000
Sewing machines, domestic	16,572 000	2,423,000	7,447,000
Vacuum cleaners domestic	52,235 000	8,000,000	12,100 000
Cooking utensils	7,836 000	4,400,000	8,800 000
Beverage machinery and equipment	9,500,000	6,000,000	12,000,000
Commercial and industrial refrigeration and air-conditioning equipment	58,700 000	30,000,000	65 000 000
Sugar-processing machinery and equipment	2,600,000	1,000,000	2,000,000
Tobacco machinery and equipment	2,200 000	1,000,000	1,500 000
Cast-iron boilers	10,000 000	3,500,000	4,500,000
Cast-iron radiators	7,500 000	1,500,000	5 000 000
Cast-iron sanitary enameled ware	4,000,000	40,000 000	55,000,000
Cast-iron soil pipe and fittings	675,000	6,600,000	11,000 000
Commercial cooking equipment (not elec.)	2,500 000	2,800 000	4,000,000
Commercial dishwashing machines	1,400,000	1,400,000	1,600 000
Direct-fired water heaters (gas and oil)	.....	6,950,000	11,575,000
Domestic cooking and heating stoves	93,000,000	42,200,000	63,300 000
Electric water heaters	2,100,000	2,025,000	3,375,000
Extended surface heating equipment	10,400,000	3,500,000	5,000,000
Fabricated piping	10,900,000	6,000,000	11,000,000
Formed steel sanitary ware	30,000,000	5,000,000	25 000,000
Gas conversion and industrial gas burners	1,500,000	600,000	1,000,000
Heating controls and heating specialties	50,000,000	10,800,000	18,000,000
High-pressure steel boilers	7,000,000	900,000	1,750 000
Indirect water heaters	.....	1,100,000	1,820,000
Low-pressure steel boilers	8,640,000	1,000,000	2 640,000
Mechanical stokers	30,000,000	3,450,000	5,750,000
Oil burners	9,200,000	6,000,000	10,000,000
Plumbing fixture fittings and trim (plumbers' brass specialties)	10,500,000	8,750,000	30,600,000
Range boilers and hot-water storage tanks	3,139,500	3,140,000	5,235,000
Steel septic tanks	100,000	225,000	338,000
Vitreous china and semi-vitreous or porcelain plumbing fixtures	17,500,000	8,750,000	17,500,000
Warm-air distribution equipment	7,500,000	4,500,000	7,500,000
Warm-air furnaces	52,500,000	9,000,000	15,000,000
Water heaters (coal and wood)	.....	563,000	938,000
Printing trades machinery	63,070,000	24,165 000	39,100,000
Barber and beauty appliances	2,500,000	2,780,000	3,480,000
Cash registers	12,840,000	3,200,000	8,000,000
Floor machines	18,000 000	1,500,000	1,930,000
Laundry equipment	10,800,000	8,600,000	10,800,000
Office machinery	81,725,000	32,000,000	52,500,000
Motion-picture equipment, 35-mm.	1,323 000	7,200,000	10,230,000
Scales and balances	6,370,000	4,600,000	6,400,000
Typewriters	17,500,000	12,000,000	30,000,000
Grand total	$3,561,529,000	$1,318,261,000	$2,507,006,000

Estimates made by important industries as to the number of months that will be required to reconvert to civilian goods production, that is lapse of time between cancellation of military contracts and beginning of operations at the rate indicated, are reported by the

War Production Board as follows:

Industry	Reconversion Time Required (unit-months) Minimum or Break-even Rate	"All out" or Capacity Rate
Automotive	8	15
CONSUMERS DURABLE GOODS DIVISION		
Domestic sewing machines	6	9
Domestic electric ranges	5	9
Nonjeweled clocks, watches	7	7
Mechanical refrigerators	6	12
Domestic laundry equipment	4	6
Electric fans	3	4
Photographic equipment	0	4.5
Metal office furniture	3	3
Flatware	3	3
Jeweled clocks, watches	12	12
Domestic vacuum cleaners	3	4
Sealed-beam lamps	4	6
Small electric appliances	3	3
Lawn mowers, hand, power	3.5	3.5
Wood furniture	0	6
Metal household furniture	2	2
Fishing tackle and reels	3	6
Metal caskets and vaults	3	3
Bedding industry	3	3
Band instruments	6.5	6.5
Bicycles	0	5
Pianos	7	7
GENERAL INDUSTRIAL EQUIPMENT		
531 commercial and ind. refrig. and air-cond. equipment	3	9
Beverage mach., equipment	7	9
Tobacco mach., equipment	7	9
Sugar process, mach., equipment	7	9
PLUMBING AND HEATING DIVISION		
Cast-iron boilers	0	3
Cast-iron radiators	0	3
Cast-iron sanitary enameled ware	2	3
Commercial cooking equipment (not electric)	2	3
Commercial dishwashing machines	2	2
Domestic cooking and heating stoves	2	5
Electric water heaters	1	2
Formed steel sanitary ware	2	2
Gas conversion and indusfrial gas burners	0	2
Heating controls and heating specialties	0	3
Low-pressure steel boilers	0	3
Mechanical stokers	0	2
Oil burners	2	3
Plumbing-fixture fittings and trim (plumbers' brass spec.)	0	1
Steel septic tanks	0	1
Warm-air furnaces	0	1
PRINTING AND PUBLISHING DIVISION		
Printing trades mach.	6	8

(*Please turn to Page* 184)

Reconversion Equipment Required To Start Civilian Production

Data from WPB

Industry	Minimum or Break-even Rate	"All Out" or Capacity Rate
Passenger automobiles	$50,000 000	$150,000 000
Powercycles	25.000	200,000
Appliances, small electric	461.000	1,953,900
Band instruments	100,900	100.000
Bedding industry		
Bicycles	30,000	210 000
Caskets and vaults, metal		150.000
Clocks and watches, jeweled	250 000	250 000
Clocks and watches, nonjeweled	725.000	725,000
Fans, electric	75,000	75,000
Flatware		
Flashlight cases, metal	175.000	175.000
Furniture, metal household	68,000	68,000
Furniture, metal office		
Furniture, wood	200 000	200.000
Fishing tackle and reels	60,000	100,000
Lamps, sealed beam		
Laundry equipment, domestic	655.000	1,100.000
Lawn mowers, hand and power	100,000	100 000
Photographic equipment		3,062.000
Pianos	50,000	50.000
Ranges, electric, domestic	250 000	500,000
Refrigerators, domestic, mechanical	4,353,000	13,013.000
Sewing machines, domestic	20.000	225.000
Vacuum cleaners, domestic	68,000	550,000
Cooking utensils	340,000	840.000
Beverage machinery and equipment		600,000
Commercial and industrial refrigeration and air conditioning equipment		3,000,000
Sugar processing machinery and equipment		100,000
Tobacco machinery and equipment		200.000
Cast iron boilers		100,000
Cast iron radiators		100,000
Cast iron sanitary enameled ware	500,000	1,000,000

Industry	Minimum or Break-even Rate	"All Out" or Capacity Rate
Cast iron soil pipe and fittings		300 000
Commercial cooking equipment (not elec.)	238,000	275,000
Domestic cooking and heating stoves	$2,509,000	$3,550.000
Electric water heaters		200.000
Extended surface heating equipment		100,000
Fabricated piping		
Formed steel sanitary ware		750,000
Gas conversion and industrial gas burners		
Heating controls and heating specialties		125.000
High pressure steel boilers		250,000
Indirect water heaters		
Low-pressure steel boilers		50,000
Mechanical stokers		
Oil burners	180,000	300,000
Plumbing fixture fittings and trim (plumbers' brass specialties)		600,000
Range boilers and hot water storage tanks		
Steel septic tanks		
Vitreous china and semi-vitreous or porcelain plumbing fixtures		1,300,000
Warm air distribution equipment		250,000
Warm air furnaces		250,000
Water heaters (coal and wood)		
Printing trades machinery		2,000,000
Barber and beauty appliances		
Cash registers		
Floor machines	150,000	285,000
Laundry equipment		
Office machinery		
Motion picture equipment 35mm		
Typewriters		
Grand total	$61,582,000	$189,331,000

Reconversion Construction Needs of Important Industries

Data from WPB

Industry	Minimum or Break-even Rate	"All Out" or Capacity Rate
Passenger automobiles	$29,000.000	$200,000 000
Appliances, small electric	564,000	643 900
Casket and vaults, metal		60.000
Clocks and watches, non-jeweled	85.000	85 000
Fans, electric	15,000	15.000
Flashlight cases, metal	775.000	775.000
Fishing tackle and reels	30,000	50.000
Lamps, sealed beam	50,000	50.000
Laundry equipment, domestic	200 000	300,000
Pianos	50,000	50.000
Ranges, electric, domestic		111,000
Refrigerators, domestic mechanical	1,929,000	7,855 000
Sewing machines, domestic		400 000
Vacuum cleaners, domestic	120.000	120 000
Cooking utensils	285,000	685 000
Beverage machinery and equipment		1,000,000
Commercial and industrial refrigeration and air conditioning equipment		7,000,000
Sugar processing machinery and equipment		200,000
Tobacco machinery and equipment		5,000,000
Cast iron sanitary enameled ware	1,000,000	1,500,000
Commercial dishwashing machines		

Industry	Minimum or Break-even Rate	"All Out" or Capacity Rate
Domestic cooking and heating stoves	$1,675,000	$3,575.000
Electric water heaters		100,000
Formed steel sanitary ware	250,000	350,000
Gas conversion and industrial gas burners		
Heating controls and heating specialties		30,000
High pressure steel boilers		
Indirect water heaters		
Low-pressure steel boilers		300,000
Mechanical stokers		
Oil burners		
Plumbing fixture fittings and trim (plumbers' brass specialties)		750,000
Vitreous china and semi-vitreous or porcelain plumbing fixtures		2,000,000
Warm air distribution equipment		1,000 000
Warm air furnaces		250,000
Floor machines		
Laundry equipment	260,000	350,000
Office machinery	60,000	60,000
Motion picture equipment 35mm		
Grand total	36,348,000	234,664,000

AGMA Annual Meeting Limited To Officers and Committee Members

Paul W. Christensen elected president. Progress report on carbide hobbing of marine propulsion gears presented by Navy men. Much of Hot Springs session devoted to engineering and commercial committee work

PAUL W. CHRISTENSEN

Elected president, American Gear Manufacturers Association

TO FULFILL the requirements of its constitution, a special annual meeting of the American Gear Manufacturers Association was held at The Homestead, Hot Springs, Va., May 20-22. Ordinarily a general meeting would have been staged at this time, but, in accordance with the prohibition on large conventions, attendance at this twenty-ninth annual meeting of the association was limited to officers and committee members—thus keeping attendance below fifty. A full report of the proceedings will be mailed to all who, because of the wartime restrictions, were unable to be present.

Announcement of election results and introduction of new officers was made by retiring president Louis R. Botsai. New officers are: President, Paul W. Christensen, who is president and general manager of the Cincinnati Gear Co., Cincinnati, Ohio; vice president, Thomas J. Bannan, who is president of Western Gear Works, Seattle, and of the associated Pacific Gear & Tool Works, San Francisco; treasurer (re-elected), Ray B. Tripp, who is vice president of the Ohio Forge & Machine Corp., Cleveland.

Newly elected members of the executive committee are: Howard Dingle, president, Cleveland Worm & Gear Co.; Elmer H. Johnson, co-partner, Gear Specialties, Chicago; Joseph R. Mahan, chief engineer, National Supply Co., Toledo, O.; and Ernest N. Twogood, executive engineer, Gear Division, General Electric Co., Lynn, Mass. Newbold C. Goin was re-elected executive secretary.

Carries On Father's Traditions

In introducing Mr. Christensen, Mr. Botsai mentioned that the 1945-46 president carries on the traditions of his father, the late John Christensen, who was a charter member of the association and who served as its president in 1934-35.

The greater part of the time throughout this meeting was taken up with committee work, the heaviest sessions being those of the General Engineering Committee and the General Commercial Committee. Several important proposed standards came up for consideration and lively discussion and as a result will be submitted to the membership for further consideration before steps are taken for final adoption. This phase of the association's work has been extremely influential over a period of 28 years in clearing up troublesome points in design, manufacture, inspection, rating, materials specification, lubrication, and many other vital matters.

The fact that this AGMA standardization work had been carried as far as it had at the beginning of the war made the vast number of gear projects involved in war production far simpler than otherwise would have been the case. Speaking of the standards and other data now available at association headquarters in Pittsburgh, Mr. Goin pointed out that more complete cataloging, added space and added personnel now make this material more readily available than ever before. He urged that more general use be made of the valuable archives of the association on the part of the membership.

Report on Use of Carbide Hob

Following up on the paper which they presented at the semiannual meeting of the association in Chicago last October (STEEL, Nov. 20, 1944, p. 112), Lieut. Alfred J. Kroog, USNR, and Richard W. Righter, engineer, Navy Department, again came on from the West Coast to continue their report on the use of carbide hob for speeding up the production of vitally needed marine propulsion gearing. This important work was initiated jointly by the Navy Department and by officials of the Joshua Hendy Iron Works, Sunnyvale, Calif., one of the moving spirits being Capt. E. D. Almy, USN (retired).

Despite initial difficulties due to the peculiar requirements of the work, lack of experience in design and manufacture of the hobs, and the wholly unfamiliar technique, trial-and-error experience plus much re-engineering of machines and tools, plus patience and hard work on the part of all concerned, now are bearing fruit in the way of results which have helped to break a serious bottleneck in the shipbuilding program still so vital to the war effort.

Lieutenant Kroog and Mr. Righter reported that more accurate and better designed carbide tooth hobs now are being made, that better provisions for sharpening them have been provided, and that further tests will be conducted in an east coast gear plant. "The Navy's goal remains," they said, "to develop carbide hobs to the point where hobbing of propulsion gears of harder materials and of smaller diameters can be accomplished on a well established production basis." This work, needless to say, is highly important to the entire gear industry.

Pacific War Pattern Puts Emphasis on Light Steel

Present demand patterns in ordnance are likely to stay unchanged until the end of the Japanese war is in sight, which means continued emphasis on lighter equipment and continued tightness in light gage steel.

As yet we have no clear picture of just how much material will be required in the Japanese conflict, according to Lt. Gen. Levin H. Campbell Jr., chief of ordnance, speaking before a meeting of the Pittsburgh Post, Army Ordnance Association May 23.

In a press conference before the meeting General Campbell pointed out that ordnance demand has dropped 30 per cent since V-E Day, will drop further in the weeks to come. However, accent on the lighter products will provide a serious conflict with civilian goods manufacturers.

Although there will be fewer fighting troops used against the Japs, there will be greater numbers of depot troops and overhead troops required per fighting man because the supply lines are about three times as long as in Europe. This also means more bases and way stations, which will require construction men and material.

These factors seem to indicate a continuation of tight sheet markets, inasmuch as major sheet tonnage is involved in the container programs and the galvanized sheet lines are already loaded for many months ahead with tonnage for construction of bases and storage units to service the long supply lines across the Pacific. Continued emphasis on the shipping container and drum program can be expected, as well as increasing volume of rockets, bombs and mortar shells.

Warns Against Use of Treaties To Override the Constitution

Speaker at forum on "American Business in a Planned World" says use of treaty-making powers sets stage for transforming American system into national socialism. Col. J. F. Drake elected new Conference Board chairman

IN A FORUM discussion of "American Business in a Planned World" in New York recently, J. Howard Pew, president, Sun Oil Co., Philadelphia, warned against the use of treaty-making powers to override constitutional limitations. The use of such power, he said, sets the stage for transforming the American system into national socialism and "is a danger that may engulf us all."

The forum was held at the general session of the twenty-ninth annual meeting of the National Industrial Conference Board at the Waldorf-Astoria—a meeting limited primarily to associates and guests in the metropolitan area. Other forum speakers were Alvin H. Hansen, Littauer Professor of Political Economy, Harvard University, Cambridge, Mass., and Senator Harold H. Burton, (Rep., O.). Dr. Virgil Jordan presided.

Col. J. F. Drake, president, Gulf Oil Corp., Pittsburgh, was elected chairman of the Conference Board, to succeed S. Clay Williams, chairman, J. R. Reynolds Tobacco Co., Winston-Salem, N. C. Dr. Jordan was re-elected president.

Also elected were four vice-chairmen: Neal Dow Becker, president, Intertype Corp., Brooklyn; Edgar Monsanto Queeny, chairman, Monsanto Chemical Co., St. Louis; Harry E. Ward, chairman, Irving Trust Co.; and Langbourne M. Williams Jr., president, Freeport Sulphur Co., New York. Rolland J. Hamilton, secretary and treasurer, American Radiator and Standard Sanitary Corp., New York, was elected treasurer, and Leonard E. Read, formerly general manager of the Los Angeles Chamber of Commerce, secretary.

Mr. Read Becomes Board Member

Mr. Read succeeds the late Harold F. Browne as secretary and as a member of the board of trustees. No other changes in the membership of the board were made.

Pointing out that the Constitution makes treaties the supreme law of the land, on a par with the Constitution itself and overriding federal laws and state constitutions, Mr. Pew said that many in this country over the past 12 years had been seeking to force a system of collectivism, although with only partial success. He declared that they now see the opportunity for establishing such a system through the "rear door" of international treaties and agreements.

"Instead of undertaking to restrict world production and world trade," the speaker asserted, "we should seek to free that trade from the straightjackets of cartels, unduly high tariffs, import quotas and all other restraints that do not come from a free choice of a free people."

Under a system of free enterprise, the United States in the short span of its national existence has achieved the most

COL. J. F. DRAKE

powerful economy on earth, Mr. Pew declared. "Nevertheless, much of our government's approach to the world's postwar economic problems is away from this tried and true American system and toward restricted collectivism."

Economic life in the postwar period will be carried on under two forms of planning, Professor Hansen declared. There will be the completely centralized, totalitarian planned economy of Russia and other parts of the world that will fall within her orbit and the democratic planning of free countries, including the British countries, Western Europe and the United States.

The planning that is currently in process in the democratic countries, he said, both with respect to the international agreements now under way and their domestic policies, can best be described as ways and means of making the market economy more workable. In these countries the price system, private enterprise and the market economy are the controlling factors. And he pointed out that it is in the nations outside of Russia and its orbit that most of the world trade goes on. It was his conviction that it will be private trading after the war as heretofore, but under the policies better suited to meet the "needs of a changing world." He emphasized that these new policies, now in the making, will not impose regimentation. The whole object, he declared, is to develop a workable market economy more in pace with the tempo of the times.

"In the two decades between the two world wars, the market economy in the free world worked very badly," he asserted. "The democratic countries are determined to develop a better functioning market economy.

Monetary Fund Discussed

"The International Monetary Fund is designed to substitute for the rigid and unworkable gold standard a modernized and flexible gold standard more suitable to modern conditions. The market economy can obviously not function well without a workable international monetary system." He described the monetary fund as a managed international monetary system. "But as a managed institution it will operate not under the arbitrary decisions made by a 'government of men.' It substitutes for the automatic forces 'rules of law' under which adjustments can be made so as to make the market economy more workable."

Similarly, Professor Hansen declared, the International Bank for Reconstruction and Development is designed to improve the functioning of international capital market—to make sure that these funds are used for productive purposes, that they are made at rates of interest which the borrower can reasonably pay, and that more stable conditions will prevail in international lending than was experienced after the last war.

Senator Burton declared that international stability has become a domestic necessity for every nation, including the United States. Similarly, he added, internal prosperity within the United States is necessary to attain international prosperity and stability.

He pointed out, however, that the country is facing postwar recovery under the greatest handicap in its history, the handicap of a national debt of more than $300 billion or more than 10 times the debt after World War I. He discussed various domestic issues and aspects, such as taxes, increased production and full employment, and inventions and new products.

Commenting on fair employment practices, he remarked that it is important to consider which should be put under local, as contrasted with federal, control. He urged greater attention also to the development of a code of fair industrial and labor relations, asserting it is essential to industrial peace and prosperity.

He implied that he would support a constitutional amendment whereby treaties would be subjected to a majority vote of the two houses of Congress instead of two-thirds vote as at present.

Uniform Class Rates Ordered East Of Rockies in ICC Freight Ruling

Decision fraught with far-reaching implications for manufacturing industry. Temporary relief granted southern and western shippers pending erection of new uniform schedule. Steel affected only to negligible extent

IN A DECISION having far-reaching implications for manufacturing industry throughout the country, the Interstate Commerce Commission last week ruled existing railroad freight classifications are unreasonable and unduly prejudicial to southern and western shippers and, pending erection of a uniform method of freight classification for the entire country, ordered temporary relief effected in the form of an increase in the East and a corresponding reduction in the West and South in class rates. The decision is said to be one of the most important in the commission's 58-year history.

The changes ordered apply to so-called "classified" freight which is largely made up of manufactured and miscellaneous goods, such as radios, sewing machines, typewriters, etc., that is, articles of the same general character which are placed in a class and where the shipment is not large enough to command a commodity rate. These class rates it is said apply to 4.1 per cent of shipments and 6.3 per cent of rail revenues. Such freight as grain, coal, oil and other raw materials move largely under special bulk rates and are not affected by the decision. Steel products will be affected by the changes to only a negligible extent, it is said.

In ordering these temporary rate adjustments the ICC stated the action will reduce the differences in the levels of the class rates in the various class rate territories, at the same time bring to a minimum the undue prejudice which it says exists in the present freight rate structure.

LCL Minimum Charges Raised

The commission in its ruling also increased the minimum charges on less-than-carload shipments moving at class rates, from 55 cents to 75 cents per 100 pounds, and as a measure of permanent relief, it prescribed that a scale of class rates be applied uniformly to the entire country with the exception of Mountain-Pacific territory.

In its report the commission allows the carriers 90 days in which to submit to it their proposal for a uniform method of freight classification. In the interim, and solely as a temporary measure, it ruled that effective Aug. 30 all present class rates in and between Southern, Western Trunk Line and Southwestern territories and between those territories, on the one hand, and Eastern territory on the other, be reduced by 10 per cent pending establishment of uniform classification. Simultaneously there will be a 10 per cent increase effected in Northern territory. Rocky Mountain and Far Western states are unaffected by the changes.

The commission's decision, reached by a vote of 9 to 2, was the result of investigations of railroad classification of freight in all parts of the country, and the class rates of all common rail carriers subject to the Interstate Commerce act, except in the Mountain-Pacific territory.

Behind the decision is the long-standing complaint of the South that the existing railroad freight structure is discriminatory to it in comparison to rates that apply in other parts of the country. Interests from other parts of the country, particularly the West, joined with the South in seeking elimination of territory divisions in which various rate differentials were allowed, and the establishment of a uniform rate structure.

In effect, by this decision, the Interstate Commerce Commission ordered that as soon as schedules can be prepared, an article moving by railroad freight shall take the same rate classification regardless of its origin and destination.

Opposing Southern and Western claims, spokesmen for eastern interests had argued that although the South and the West had higher class rates, they enjoyed much lower commodity rates, especially on such products as cotton. The East also argued that if class rates were revised, commodity rates also should be looked into. The railroads opposing the changes proposed by the South and West denied that present rates are discriminatory, holding that they are in keeping with railroad costs for a territory of smaller population, of less industrial development and of smaller traffic volume.

The ICC decision is viewed in the South and West as a momentous victory. Spokesmen for southern and western interests for a long time past have protested that manufacturers in eastern rate territory have been able to undersell manufacturers in other areas because of freight rate inequalities. Northern and eastern reaction to the decision was equally as gloomy as was the jubilation of the South and West.

It is estimated that to carry out the far-reaching changes prescribed by the ICC it will take more than two years of labor on the part of freight rate experts.

TRANSITION TOPICS

PRICES— Increases granted by OPA on steel products said by industry spokesmen to be inadequate to compensate for heavier costs incurred during war years. Transition period is bringing cancellation of profitable specialty items and return to standard products on which producers have been suffering a loss. See page 73.

RECONVERSION— Scarcity of raw materials and critical machine tools slowing resumption of civilian goods manufacture. WPB survey indicates peak peacetime output of 72 industries will be only five-sevenths of wartime value. See page 76.

FREIGHT RATES— Interstate Commerce Commission relief to southern and western shippers expected to have far-reaching effects. Applies primarily to manufactured goods. See page 81.

SURPLUS TOOLS—Sales have started on volume basis. Industry spokesmen outline views on disposal to Senate subcommittee. See page 82.

AUTOMOBILES— First releases of production parts for passenger cars places suppliers in quandary. Automakers institute self-aid plan for locating urgently-needed tools and equipment. See page 89.

WEST COAST— Relaxation of restrictions on civilian manufacture urged to prevent widespread unemployment as orders of shipyards and other war plants are reduced. See page 95.

AIRCRAFT— Unwise disposal policies may cripple aircraft industry, weaken country for possible future conflict, planemaker warns. See page 96.

Surplus Machine Tool Disposal Problems Discussed at Hearings

Subcommittee of Senate Small Business Committee told that sales have started on volume basis. Industry spokesmen give views and emphasize need for sound basis for disposal. Sales safeguards held needed to prevent discrimination

A GOOD beginning has been made in approaching the problem of disposing of government-owned surplus machine tools and allied equipment. Sales already have been undertaken on a volume basis, and certain decisions are expected to make the gigantic task easier, the Surplus War Property Subcommittee of the Senate Small Business Committee was informed during its recent hearings on this subject.

The Surplus Property Board has decided tentatively to allow sales of machine tools by owning agencies to contractors now in possession of them, Col. Edward H. Heller, member of the board, told the subcommittee.

"We could apply a theoretical equality of opportunity in point of time and refuse to sell any machine tools until they were all declared surplus, in effect freeze all government tools until after the cessation of hostilities, but that course of action could result in crippling the reconversion program. It presently appears to us that the necessities of reconversion and re-employment must override all other considerations," he said. "In the event that abuses and discrimination creep into the operation of this program we will promptly apply the brakes."

In arriving at this decision, said Colonel Heller, a number of basic considerations were taken into account, the first being that contractors with government tools in their plants are entitled to a clear statement of government policy in this matter, and without delay.

SPB has not yet made a decision as to disposition of machine tools in government-owned plants and arsenals, said Colonel Heller; answers to some important legal questions must first be found.

The subcommittee was greatly interested in Colonel Heller's comments about the probable relation of supply to demand in the field of machine tools after the war. While he felt that there will be an adequate supply of almost all types of machine tools for postwar enterprise, large and small, he did not believe that a machine tool glut would occur after the war.

SPB has decided on a number of safeguards to prevent discrimination, 1—Types of machine tools in short supply will not be sold to contractors in possession but will be handled specially; 2—the pricing policy will be uniform in all cases; 3—the methods of inventory control will be made as thorough as possible to the end prospective buyers may have complete information about offerings; 4—contractors in possession must indicate promptly whether they propose to buy or not to buy the government tools in their plants.

Assistant Attorney General Wendell Berge offered a caution about the policy under which contractors are permitted to buy machine tools which are located

COL. EDWARD H. HELLER

in their plants. The necessities of war production, he said, have increased the concentration of industrial power in the hands of a few large companies, and he did not think it was the intention of Congress to further such concentration in the reconversion period. There now is no overall inventory showing all the tools owned by the government, and until such an overall inventory is completed, there will be no means of knowing which tools are in short supply. Such information will be needed, he said, to protect new and small enterprises which will need these tools.

The sale of surplus machine tools already has become a volume business, the subcommittee was told by Walter E. Joyce, assistant surplus property director, Reconstruction Finance Corp.

"The RFC, in co-operation with commercial banks, has set up the machinery needed to enable industry, large and small, to obtain financing for machine tool purchases," said Mr. Joyce. "Paper work and delay are eliminated. RFC automatically guarantees bank loans to companies up to 75 per cent with a ceiling of $250,000 for each loan. Where local credit is not available RFC makes loans direct to the borrower. Sales of machine tools will also be made on a deferred payment plan with generally a minimum down payment of 15 per cent of sales price and maximum credit of 5 years with interest at 4 per cent."

Mr. Joyce told about RFC's methods of maintaining inventories, and of arousing interest among potential purchasers. A good many companies now making direct war materiel may not have fully crystallized plans as to what they expect to manufacture after the war, to accommodate such companies the RFC, in the interest of the national economy, will furnish equipment to them under short-term leases. So that the interests of small business may be fully cared for, representatives of the Smaller War Plants Corp. are to be found at the RFC regional offices throughout the country.

One of the prime requirements in the program, said Mr. Joyce, is maintaining the machine tools and other equipment so that they will not rust or otherwise deteriorate. "Uniform instructions on this subject have been compiled and are being revised from time to time in the light of experience. Sites for 63 storage and display centers have been selected, of which 30 have been fully activated; these are strategically located in industrial areas."

Says SWPC Can Help in Disposal

Smaller War Plants Corp. has had much experience in furnishing financial aid and in other ways assisting small companies to acquire new machine tools, so that it is fully organized to furnish the same help in connection with the sale of surplus tools as they become more freely available, Maury Maverick, chairman of that corporation, told the subcommittee.

"Our field representatives are authorized to help small plants buy surplus machine tools on the basis of a 15 per cent down payment, the balance to be amortized over a period of 5 years," said Mr. Maverick. "Interest rate on the unpaid balance is 4 per cent.

"The corporation is also extending authority to the field offices to lease surplus machine tools to small plants. In such cases the corporation will first acquire the machine tool out of surplus. The standard terms will be 1½ per cent rental per month for the term of the lease, with an option to the small plant to purchase the tool during the lease at the cost price less depreciation. We believe that these terms will stimulate acquisition by small plants of many tools which they might be hesitant to buy outright as they prepare to reconvert from war to peace. These terms also serve to foster the creation of new small businesses."

SWPC district offices now have substantial lists of the machine tool requirements of small plants in their territories,

The CONE AUTOMATIC MACHINE COMPANY sees many GOOD THINGS AHEAD

It is reported that . . . . . .

Ball bearings, for precision equipment, are now made with outside diameter as small as two millimeters. *Science News Letter.*

get ready with CONE for tomorrow

The first cotton crop to be harvested entirely by machine has recently been reported. The result seems to be a lower grade of cotton offset by reduced cost. *Time.*

get ready with CONE for tomorrow

Postwar automobile wheel rims are to be wider, or about three-fourths of the tire width. *National Wheel Rim Assn.*

get ready with CONE for tomorrow

The combined use of the electron microscope and the three-dimensional vectograph is making possible better observation of the structure of metals and consequent improvement of alloys. *Dow Chemical Company.*

get ready with CONE for tomorrow

A new product is intended to seal the spaces between spot welds and make a continuous liquid-tight joint. *Presstite Engineering Co., St. Louis.*

get ready with CONE for tomorrow

A new system of aircraft engine lubrication is claimed to supply an adequate flow of oil as high as 45,000 feet. *Penn. State College and Sharples Co., Phila.*

get ready with CONE for tomorrow

The number of persons employed in individual research laboratories just about doubled in the ten years ending in 1940. *G. Edward Pendray, Asst. to President, Westinghouse Electric & Mfg. Co.*

get ready with CONE for tomorrow

A new process of adding carbon black to liquid rubber latex will, it is hoped, reduce the cost of tires and add to their service. *General Tire & Rubber Company.*

get ready with CONE for tomorrow

It is claimed that one of the new rechargeable flashlight batteries will outlast 400 of the usual dry cell type. *B. F. Goodrich Co.*

A new 4 by 6 foot "tectonic" map of the United States shows the complete geologic structure of the country and is said to be the first of its kind ever published. *American Assn. of Petroleum Geologists.*

get ready with CONE for tomorrow

A new device called the "Odograph" automatically makes a map, in any scale, of a road while being carried in a fast-moving automobile. *U. S. Army Engineer Corps.*

get ready with CONE for tomorrow

A jet propulsion drive for torpedoes has recently been patented. *Science News Letter.*

get ready with CONE for tomorrow

A portable electrostatic air cleaner is used to precipitate the smoke produced by welding. *Westinghouse Electric & Mfg. Co.*

A manual of instruction in the making of aerial "highway signs" for the guidance of aircraft has just been published. *Civil Aeronautics Administration.*

get ready with CONE for tomorrow

The Combined British Astronautical Societies have designed a "space ship" in which they propose to send three men to the moon in about 48 hours. *Electronic Markets.*

get ready with CONE for tomorrow

An automobile manufacturer is already planning the assembly-line production of helicopters. *Nash-Kelvinator Corp.*

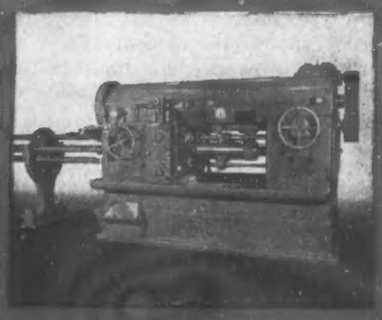
get ready with CONE for tomorrow

A new material for shoe soles is said by the maker to be lighter and more durable than leather and resistant to oil and water. *B. F. Goodrich Co.*

get ready with CONE for tomorrow

More than 80,000 farmers obtained government priorities to electrify their farms, in 1943, as a means of increasing food production. The 1944 total will probably reach 120-, 000. *EMPIC No. 8.*

This machine cuts its own weight in metal in four days



3½' 6-Spindle Conomatic

To produce the part shown, 6 pounds of chips — over a sixth of a ton of metal per hour — were removed from WD13:4 bar stock.

CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U. S. A.

and this information is to be expanded immediately by a survey of all metalworking plants. On the basis of this information the SWPC proposes to undertake an intensive campaign of selling surplus tools.

The War Department within the next 60 days expects to be able to release some 12,020 standard general-purpose and some 3000 special-purpose machine tools. Subsequently it should be able to release some 4400 standard general-purpose and 600 special-purpose machine tools monthly thereafter for a period of about four months, the subcommittee was informed by Brig. Gen. David N. Hauseman, director of the Readjustment Division, Army Service Forces. Eventually these offerings will swell into a huge volume.

"At the end of all hostilities," said General Hauseman, "machine tool offerings probably will be at a greater rate and in greater quantity than they can possibly be disposed of. It is feared that disposal will not keep abreast of these tools, and that the War Department may thus be compelled to assume the responsibility for their custody, care and handling. We would welcome any action which could be taken to relieve this threatened situation."

The War Department, said General Hauseman, is one of the largest individual owners of machine tools, and these tools are principally the newer and more modern types made in the last four years. A recent survey shows that the War Department owns machine tools in the numbers and at the initial costs indicated in the following:

	Number	Cost
Industrial facilities	145,902	$716,420,120
Command installations	16,677	32,913,110
Total	162,579	$749,333,230

The foregoing total includes all such tools except a small number engaged on scattered projects. It includes both standard general-purpose and special-purpose machine tools devised as follows:

Standard	Number	Cost
Industrial facilities	116,647	$536,657,265
Command installations	16,577	32,446,110
Total	133,224	$569,103,375
Special	**Number**	**Cost**
Industrial facilities	29,255	$179,762,853
Command installations	100	467,000
Total	29,355	$180,229,855

Average ages of these machine tools are: Over 5 years 15,897; average 3½ years 23,559; average 3 years 120,079; average 2 years 3,044.

Up to this time the War Department has maintained its machine tool inventories on a decentralized basis. Now that production pressure is likely to be relaxed in the near future, it should be possible to maintain a central record. Such an arrangement, said General Hauseman, should expedite redistribution so that this excess equipment may be put to work.

Basic machine tool disposal policies of the War Department, said General Hauseman, are: 1—When a machine tool becomes idle, efforts are exerted to get it into use in other war work; 2—when efforts to redistribute an idle machine tool have failed, it is promptly reported to the Reconstruction Finance Corp. for disposal; 3—the War Department is putting into its postwar reserve such idle special-purpose machine tools as can be used for production of military items only; it is not now putting any standard general-purpose tools into this reserve.

The War Department's best estimate of its postwar reserve requirements of machine tools, not including any allowance for what the Army Air Forces will want, is as follows:

	Number	Cost
Standard tools	34,425	$202,066,879
Special tools	4,636	28,591,752
Total	39,061	$230,653,631

These figures are to be regarded only as preliminary, General Hauseman warned, as there is no basis for an accurate estimate.

WENDELL BERGE

"The Army Air Forces, for example," he said, "now are studying radical changes in their airplane and engine programs in connection with jet propulsion, and cannot furnish an accurate estimate of their postwar requirements at this time. Furthermore, the War Department cannot make accurate estimates of its postwar needs until it is informed as to the size of the postwar army."

Only a small number of contractors have options to acquire machine tools in their possession, said General Hauseman, and this factor is not important for the reason the War Department requires that these options be waived or exercised promptly so that the process of redistribution will not be delayed.

Machine tools and allied equipment in the ownership of the Navy number 254,706 items and are valued at $876,348,000, Rear Admiral W. A. Buck told the subcommittee. The total includes 238,842 standard general-purpose and 15,864 special-purpose tools. Tools comprising about 61 per cent of the total are in use in government-owned and privately-owned plants and the rest in Navy yards, and other Navy establishments. About 75 per cent of Navy-owned metalworking machinery is not more than five years old.

"The Navy plans to retain its metalworking machinery located in Navy shore establishments, amounting to approximately 99,356 items, and to take over from contractors 19,000 items for postwar reserve," said Admiral Buck. "In addition, about 8000 items for modernization of Navy shore establishments will be taken over from contractors as the machinery becomes idle, to displace worn-out and obsolete machinery which will be declared surplus.

"These present plans, however, are based on the assumption that, with respect to a number of the Navy-owned privately operated plants, purchasers will be found who can and will keep these facilities, including their metalworking machinery, intact and in readiness for remobilization for war production. If sales cannot be made on some basis that will adequately preserve them for national defense, present Navy plans call for these plants to be placed in postwar standby. To the extent plants are placed in standby, the postwar retention by the Navy of metalworking machinery will be increased correspondingly. The total number of items of metalworking machinery contained in these plants is 23,177."

Navy production programs in general are geared to the war in the Pacific and are being maintained, said Admiral Buck. The single exception is the Navy shipbuilding program which passed its peak late in 1944; tools rendered idle by shipbuilding cutbacks, however, may be required in the expanding ship repair program. A study conducted by the Navy, he said, indicates that Navy contractors desire to retain 34 per cent of Navy-owned machinery. Allowing for these factors, it is probable the Navy eventually will declare about 75,000 of its present metalworking machines in privately-owned plants as surplus.

"To minimize the quantity of machinery to be removed, thereby relieving the government of considerable cost of removal and the burden which will be placed upon transportation, storage space and manpower, the Navy believes that as much of its surplus machinery as possible should be sold to contractors in possession, or during the plant clearance operations," Admiral Buck said.

Speaking as a machine tool manufacturer, William P. Kirk, vice president and sales manager, Machinery Department, Pratt & Whitney Division, Niles-Bement-Pond Co., stressed the need for

a complete survey that will show the machine tools that are owned by the various branches of the government, with information as to which will become surplus at this time and at the end of the war with Japan.

"We have no idea how many machines belong to the government, where they are, and how many of them will be thrown into the surplus. We do not know until that survey has been made how many machines produced during the war are in the hands of private owners. There is no way of knowing how many of these will be sold when the war is over. They are, however, a factor in the situation. Since they will be first on the market, they will be aggressively sold and probably will be sold before the government-owned surplus can be sold, and they will be sold at what they can bring and not at the Clayton price level. We hope there will not be very many of them but we have no way of finding out," said Mr. Kirk.

"Because of the enormous size of the task, we strongly recommend that every possible sales channel be opened as quickly as possible," said Mr. Kirk. "So far as machine tools are concerned, they are as follows:

"(1)—Sale to the contractor who now has the machine tool in his plant, in accordance with the option in his contract.

"(2)—The second channel is sale to federal or state governments, their subdivisions and instrumentalities, and to schools and colleges not organized for profit.

"3—The third course is sale by the Defense Plant Corp. direct to the user 'as is and where is' from the government warehouse.

"(4)—The fourth channel is sale through used machinery dealers.

"(5)—The fifth outlet is through the machine tool builder. Many users will prefer to buy the machine after rebuilding by the original manufacturer."

Mr. Kirk was dubious about the possibilities of solving the machine tool problem by selling our surplus machine tools abroad. Assuming that 405,000 machines, about half the number produced during the war, are declared surplus, these machines would have an approximate value of $1,741,500,000. In the last peacetime decade, 1927 through 1936, Russia bought $38 million worth of machines and was our big export customer, the United Kingdom followed closely with $30 million worth, and our total export of machine tools in those ten peacetime years was $146 million, "and we are talking about a problem on the order of $1,741,500,000," said Mr. Kirk.

Mr. Kirk objected to that feature of the Surplus Property Disposal Act which establishes priorities in disposing of government-owned machine tools. These priorities are entirely unnecessary since "you have more machine tools than you are going to be able to sell . . . It is unfair to hamper the administrative agencies of the government by presenting several objectives in the disposal problem when only one is important, and that is the maintenance of employment in the postwar period."

H. H. Pease, president, New Britain Machine Co., New Britain, Conn., told the subcommittee the first consideration in dealing with surplus machine tools after the war is to make sure that United States arsenals and yards are thoroughly equipped with modern tools from this surplus. He said we should have on hand in government establishments the machines that will be needed for an adequate defense, so that the production of munitions could be begun instantly.

"In addition to government arsenals and yards, which in the aggregate have never manufactured more than a very small percentage of the total munitions required by the country, there should be a substantial reserve of idle machine tools properly stored and protected against deterioration, which may be

WILLIAM P. KIRK

drawn on by the industries on which the government depends for the bulk of its munitions production in time of war.

"The policy of thoroughly equipping United States government establishments and building up a substantial reserve of idle machine tools should be applied in particular to screw machines."

Mr. Pease made the point that the surplus machines constitute a great opportunity for the nation. Machines built during the war are modern, are more productive and produce at lower cost; they give us an opportunity to replace the 605,400 machine tools over 15 years old, and entirely obsolete, that are in American industry today.

The sale of our surplus machine tools abroad would not be a good solution of the problem, said Mr. Pease. "It would be a tragedy indeed if our foreign competitors were to re-equip their industries with America's finest machine tools and then come into competition with us with lower wage rates."

To encourage utilization of surplus machines, he recommended an amendment of the Clayton pricing formula on surplus machine tools so as to permit an additional discount "to any manufacturer who will buy one of these machines and scrap an old machine from his plant."

Charles A. Simmons, president, Simmons Machine Tool Corp., Albany, N. Y., also told the subcommittee that less emphasis should be placed on securing maximum prices for government-owned machine tools. The big necessity, he said, is to dispose of all these machines quickly so that they will afford opportunities for employment.

"A sound basis for this disposal can be achieved by setting up a lower price formula than anything thus far proposed, and I believe that it can be as low as 20 per cent of the original cost of the machine.

"Give industry 60 days in which to select at this price the government-owned machine tools now in their plants. It is reasonable to believe that private industry would immediately take 30 per cent of the total for reconversion requirements. Have the government earmark those machines it proposes to hold as standby equipment—approximately 30 per cent. Scrap immediately all special machines for which there is no further use. By these steps the surplus of approximately 500,000 tools will probably have been reduced to 200,000. Permit anyone to buy from these 200,000 machines; this will encourage the emergence of 'venture capital'."

Orrin B. Werntz, executive secretary of the National Screw Machine Products Association, Cleveland, reported that not less than 34,000 screw machines have been built during the war. Of these about 23 per cent were shipped abroad, leaving 26,000 in this country. About 6000 of these are "out-size" machines, 2-inch or over, of which not more than 1000 could be put to use; the other 5000 should be held as standby equipment.

As to the remaining 21,000 machines, some 8000 are in private hands and 13,000 are distinctly surplus. This problem best can be solved by providing an incentive both to replace old equipment and guarantee the junking of old equipment.

James E. F. Moorman, Detroit, who for the past 35 years has been engaged in the liquidation of plants, machine tools and factory equipment, expressed the opinion that "the simplest, promptest and most satisfactory methods of disposing of surplus war property would be through the method of public auctioning. Under this method," he said, "every buyer, large or small, is given an equal opportunity; also, the method is highly economical, and would eliminate costly processing and conditioning."

WPB Allots Increased Quantities Of Steel for Transportation

Third-quarter allotment of 1,339,588 tons of carbon steel covers 87 per cent of ODT requirements. Construction of 250 passenger cars authorized for the first time since 1942, but cars will not be in production until early in 1946

INCREASED quantities of controlled materials have been allotted by the War Production Board for transportation equipment.

Total allocations of carbon steel for transportation for the third quarter are 1,339,588 short tons, the Office of Defense Transportation announced recently. This is the largest allotment for any quarter of 1945 and amounts to 87 per cent of the ODT requirement of 1,532,136 tons as compared with only 70 per cent of the program in the second quarter.

Construction of new railroad passenger cars is now authorized for the first time since 1942, but, said the ODT, no new cars will be in production until early in 1946, and no relaxation of travel curbs is in sight, in view of heavy troop movements involved in the Army's announced redeployment plan.

Carbon steel allotments for the more important transportation items in the third quarter are as follows:

REPLACEMENT RAIL: 600,000 tons requested; 495,900 tons allotted for railroads, 13,500 for transit lines. In the second quarter, with the same amount requested, allotments were 417,000 and 11,000 tons, respectively.

LOCOMOTIVES: The full 41,500 tons required were allotted. This compares with 30,000 tons in the second quarter.

FREIGHT CARS: 227,000 tons required, 220,000 tons allotted. This will cover the present schedule of about 11,000 cars to be built in the fourth quarter.

PASSENGER TRAIN CARS: 7348 tons of carbon steel required; 5000 tons allotted, plus 5500 tons of alloy steel. This will produce 250 coaches, head-end cars and nonluxury type diners, and starts a program of 250 pasenger cars quarterly beginning the first quarter of 1946. These are the first coaches and passenger-carrying cars authorized since 1942. This program is the result of pressure from the ODT for equipment to carry next winter's heavy passenger load caused by the Army's announced redeployment program.

TRACK ACCESSORIES: Requirements, 300,000 tons; allotment, 244,500 tons for railroads, and 4500 tons for transit lines.

HIGHWAY TRANSPORT: Allotments were granted to meet requirements of programs currently authorized by WPB. Steel for integral buses actually exceeds the stated program of 8300 tons by 4700 tons to permit the production of 1100 additional units in 1945, making the entire year's production about 10,000. The third quarter allotment of steel for trucks is 76,600 tons which, according to present estimates, will bring the entire year's production to 186,000 units. Other allotments are: For street cars, 950 tons; bus bodies, 6000 tons; trolley coaches, 300 tons; trailers, 9200 tons; third axles, 500 tons.

AUTOMOTIVE REPLACEMENT PARTS: Required and allotted, 155,000 tons. This is a return to the figure for the first quarter of 1945, after having dropped to 130,000 tons for the second quarter.

WATER TRANSPORT: 30,000 tons required, 28,000 tons allotted.

PETROLEUM AND LIQUID TRANSPORT: 438 tons required and allotted, for tank trailers.

ALLOY STEEL: 128,840 tons required and allotted. This compares with 98,000 tons allotted for the second quarter. The necessary amounts of copper and aluminum were allotted to accord with the steel allotments.

Construction Machinery Demand Expected to Hold

Even though military requirements for construction machinery will fluctuate until V-J Day, a reasonably steady demand for civilian use may be expected, and the industry will be called upon in 1945 to maintain production at or near present levels, the War Production Board's Construction Machinery Division said recently.

The value of construction machinery shipped in 1944 was about $820,000,000, an increase of approximately $100,000,000 over 1943 shipments.

Tracklaying tractors produced in 1944 constituted 37 per cent of total production and were valued at approximately $300,000,000. The 1944 production program called for 37,041 units, of which 34,066 were produced. In addition 4801 Class II tractors were produced by military facilities at Decatur, Ill., and Berwick, Pa. Scheduled production for 1945, not including that from plants operated by the military, is 38,583 units.

Allied tractor equipment produced in 1944 amounted to about 10 per cent of the industry's total production, with a dollar value of approximately $85,000,000. Production of chief items in 1944 and amounts scheduled for 1945 are:

Tractor-mounted cranes and shovels: 1944—9359 units; 1945—5400 units. 'Dozers: 1944—28,268 units, including production at Berwick, Pa.; 1945—22,000 units, exclusive of Berwick production. Tractor-mounted winches; 1944—8,039 units; 1945—9,040 units.

Power cranes and shovels accounted for about 25 per cent of the industry's 1944 production, and comprised 2,739 truck-mounted units and 7,313 crawler-mounted units. The 1945 schedule calls for 4,736 truck- and 6,808 crawler-mounted units.

Of the remaining items of construction machinery, motor graders were the only kind for which production was scheduled in 1944 and is again being scheduled in 1945. The 1945 program calls for 5,126 motor graders as compared with production of 3,863 units in 1944.

Appointments-Resignations

Samuel W. Anderson has resigned as program vice chairman and as chairman of the requirements committee, War Production Board. Lincoln Gordon, deputy program vice chairman, has been appointed to succeed Mr. Anderson in both capacities.

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Milton Starr has been appointed assistant vice chairman, Office of Civilian Requirements, War Production Board.

o o o

Philip D. Wilson has resigned as special assistant to the chairman of the War Production Board. Until recently, he also was vice chairman for metals and minerals. He has resigned to become assistant to the president of Baker & Co. Inc., refiners of precious metals. Before his appointment as vice chairman, Mr. Wilson was director of WPB's Aluminum and Magnesium Division.

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A. C. C. Hill Jr., WPB deputy vice chairman for civilian requirements, will act as head of the OCR during the absence of William Y. Elliott, vice chairman of the office.

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Robert T. Amis has been appointed director of compliance, Surplus Property Board.

o o o

C. Irving Hansen has entered on duty as director, Division of Procurement, United States Maritime Commission, replacing E. C. Walsh Jr., resigned.

o o o

Ernest A. McMillan of San Francisco has been appointed acting director, Shipbuilding Stabilization Division, Office of Labor Production, WPB.

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Maj. Jonas Reiner has been appointed deputy administrator for consumer's goods, Surplus Property Board.

PRIORITIES–ALLOCATIONS–PRICES

Weekly summaries of orders and regulations, together with official interpretation and directives issued by War Production Board and Office of Price Administration

REVOCATIONS

The following orders have been revoked by WPB:

GALVANIZED WARE: Order L-30-a which governed production of galvanized ware. (L-30-a)

LAMPS: Order L-33 which prohibited production of table, floor and other types of portable lamps for civilians except under "spot authorizations." (L-33)

REFRIGERATION, AIR CONDITIONING EQUIPMENT: Order L-38 which covered production and delivery of industrial and commercial refrigerating and air conditioning machinery and equipment; and order L-126 which set forth required specifications and schedules for specified items of such items, and schedules I, III, and VI of the latter order. (L-38 and 126)

SIGNAL AND ALARM EQUIPMENT: Order L-39 which controlled production and distribution of fire protective, signal and alarm equipment. (L-39)

CIVILIAN AIRCRAFT: Order L-48 which restricted the transfer and manufacture of civilian aircraft. (L-48)

TRACTORS: Orders L-53 (track-laying tractors) and L-53-b (tractor repair parts) which restricted sale and delivery of these items. These items are now covered by order L-192. (L-53, 53-b)

OFFICE MACHINES: Order L-54-c which controlled production of all types of electric and nonelectric office machines (exclusive of typewriters.) (L-54-c)

LAWN MOWERS: Order L-67 which controlled production of hand, gang and power lawn mowers. (L-67)

PAPER-MILL MACHINERY: Order L-83 which restricted manufacture of paper-mill machinery and parts. (L-83)

ELEVATORS AND ESCALATORS: Order L-89 which covered production of elevators and escalators. (L-89)

GOLF CLUBS: Order L-93 which prohibited manufacture of golf clubs, except for the armed services or under "spot authorization." (L-93)

PASSENGER CARRIERS: Order L-101 which restricted production and delivery of street cars, trolley coaches, integral buses and bus bodies. (L-101)

HAND TRUCKS: Order L-111 which covered production and delivery of hand trucks and other handling equipment. (L-111)

CUTLERY: Order L-140-a which restricted patterns and quantities of various types of cutlery. (L-140-a)

PLUMBING AND HEATING TANKS: Order L-199 which controlled the manufacture of range boilers and hot water storage tanks. (L-199)

HOUSE TRAILERS AND MOBILE HOUSES: Order L-205 which controlled production and distribution of house trailers and expansible houses. (L-205)

WIRE CLOTH: Order L-209 which restricted manufacture of wire cloth for manufacture of pulp, paper and paperboard. (L-209)

ELECTRIC MOTORS AND GENERATORS: Order L-221 which restricted purchase, sale and manufacture of electric motors and generators. (L-221)

PRINTING TRADES MACHINERY: Order L-226 which controlled production and delivery of printing trades machinery. (L-226)

ELECTRIC MOTOR CONTROLLERS: Order L-250 which restricted manufacture of and established specifications for electric motor controllers. (L-250)

PHOTOGRAPHIC EQUIPMENT: Order L-267 which controlled production and distribution of photographic equipment and accessories. (L-267)

BUSWAYS: Order L-273 which established rating floors and restricted delivery. (L-273)

ALARM CLOCKS: Order L-275 which controlled production and distribution of spring-driven and electric alarm clocks. (L-275)

FOOD PROCESSING MACHINERY: Order L-292 which controlled production and delivery of food-processing machinery. (L-292)

WELDING EQUIPMENT: Order L-298 which prohibited acceptance and delivery, except as authorized, of resistance welding equipment. (L-298)

LUBRICATION EQUIPMENT: Order L-314 which covered production and delivery of lubrication equipment. (L-314)

JACKS: Order L-322 which standardized and simplified production of jacks (mechanical, hydraulic, air and electrically operated).

PRINTING PLATES: Order M-339 which limited the amounts of copper and zinc that manufacturers could use in producing printing plates. Delivery and use of these metals remain subject, however, to order M-11-b and CMP regulations. (M-339)

AMENDMENTS

The following orders have been amended:

SUMP PUMPS AND CELLAR DRAINERS: Restrictions on manufacture of electric sump pumps and electric cellar drainers have been removed through revocation of schedule X of the plumbing and simplification order. (L-42)

PORTABLE ELECTRIC LIGHTS: Restrictions on production and distribution of flashlights and other portable electric lights operated by dry cell batteries have been removed from order L-71, but the provisions pertaining to dry cell batteries have been retained in the order. (L-71)

HAND TOOLS: Schedule II of the hand tools simplification order, which limited production of manually-operated wood and special purpose saws to types, grades, sizes and number of models specified, has been revoked. (L-157)

AUTOMOTIVE REPLACEMENT PARTS: All restrictions on production and distribution of automotive replacement parts have been removed by a revision of the controlling order. (L-158)

CONSTRUCTION MACHINERY: Order L-192, as amended, eliminates production scheduling and substitutes list I (with 14 items) for the former schedules A and B. The order now provides in part: Up to 75 per cent of each producer's monthly output of each model of the items covered by the order is reserved for the military; the balance of items on list I may be sold without restriction while specific WPB authorization is required for sale of the balance of output of items on list II. Application for authorization is made on form WPB-1319 and is filed in the nearest WPB field office.

When a producer's unfilled orders for a particular repair part exceed his inventory of that part, he must reserve up to 75 per cent of his total deliveries of the part for the military. Producers must file monthly reports (form WPB-1689) on production, shipments and unfilled orders on or before the 15th of each month. (L-192)

HARDWARE SIMPLIFICATION: Appeals from provisions of the hardware simplification order may now be filed directly with WPB's Building Materials Division in Washington. Schedule IV of the order, covering tackle blocks, was amended to permit production of pressed steel shell blocks of specified types and sizes. (L-236)

FARM MACHINERY: All production quota limitations on makers of farm machinery and equipment and related repair parts have been removed. Large producers, those whose total net sales of all products were $500,000 or more in 1941, must obtain an approved schedule for each item of farm machinery and equipment they plan to make after July 1 and may produce only in accordance with that schedule. Schedules must be filed before June 1. There are no limits on small producers and they are not required to file production schedules or monthly reports of production. (L-257-c)

INSTRUCTIONS

MRO SUPPLIES: Amendments to schedule A of CMP regulation No. 5 provide AA-2 ratings for MRO supplies for new nonmilitary passenger motor vehicles, bodies, engines, parts and accessories, civilian aircraft and domestic refrigerators and parts. Rating of AA-1 is continued for repair parts for refrigerators and is now assigned for repair and replacement parts for civilian automobiles. Assignment of AA-3 rating for MRO supplies to manufacturers operating under PR 25 has been eliminated in the amended schedule A. Each of these manufacturers now will use the rating for MRO supplies assigned to his particular business in schedule A. Manufacturers whose businesses are not listed in schedule A may use a rating of AA-5 for MRO supplies under terms of the regulation (CMP No. 5)

PRIORITIES: Revocation of a limitation order affecting an item on either list A (items which may be delivered without regard to any WPB preference rating) or list B (items for the procurement of which blanket MRO supply ratings may not be used), does not, in any way, affect the restrictions imposed by PR 3 for either list A or list B. Each item on the lists, even though reference is made for the definition of these items to an order now revoked, is still subject to the same definition.

Outstanding authorizations for delivery of typewriters and office machines remain in effect. Future application or extension of blanket MRO supply ratings to obtain these items is prohibited. (PR No. 3)

NEW ORDER

CIVILIAN TRANSPORT AIRCRAFT: Conditions under which civilian transport aircraft may be manufactured and delivered to United States carriers are prescribed in a new order, P-47-a, issued by WPB. Priorities assistance for converting military type surplus aircraft to suitable civilian type, previously accorded under direction 1 to L-48, revoked, is being continued under provisions of the new order. Aircraft manufacturers in need of "turn-around" construction are advised to apply to their nearest WPB field office on form WPB-617, labeling it "For Reconversion Construction."

Manufacturers needing assistance in acquiring new plant equipment may apply on form WPB-1319 to their nearest field office as provided in direction 2 to PR No. 24.

Procedures dealing with the obtaining of materials necessary for tooling, such as dies, jigs and fixtures, are described in directions 35 and 25 to CMP regulations No. 1 and No. 5, respectively.

By direction 2 to order P-47, WPB provides a method for obtaining priorities assistance for the purchase of such maintenance equipment as aircraft engines and metal propellers. (P-47, 47-a)

PRICE REGULATION

PACKERS' TIN CANS AND CONDENSED MILK CANS: A formula for determining maximum prices for packers' tin cans and condensed milk cans made from electrolytic tin plate without enamel has been established. (No. 350)

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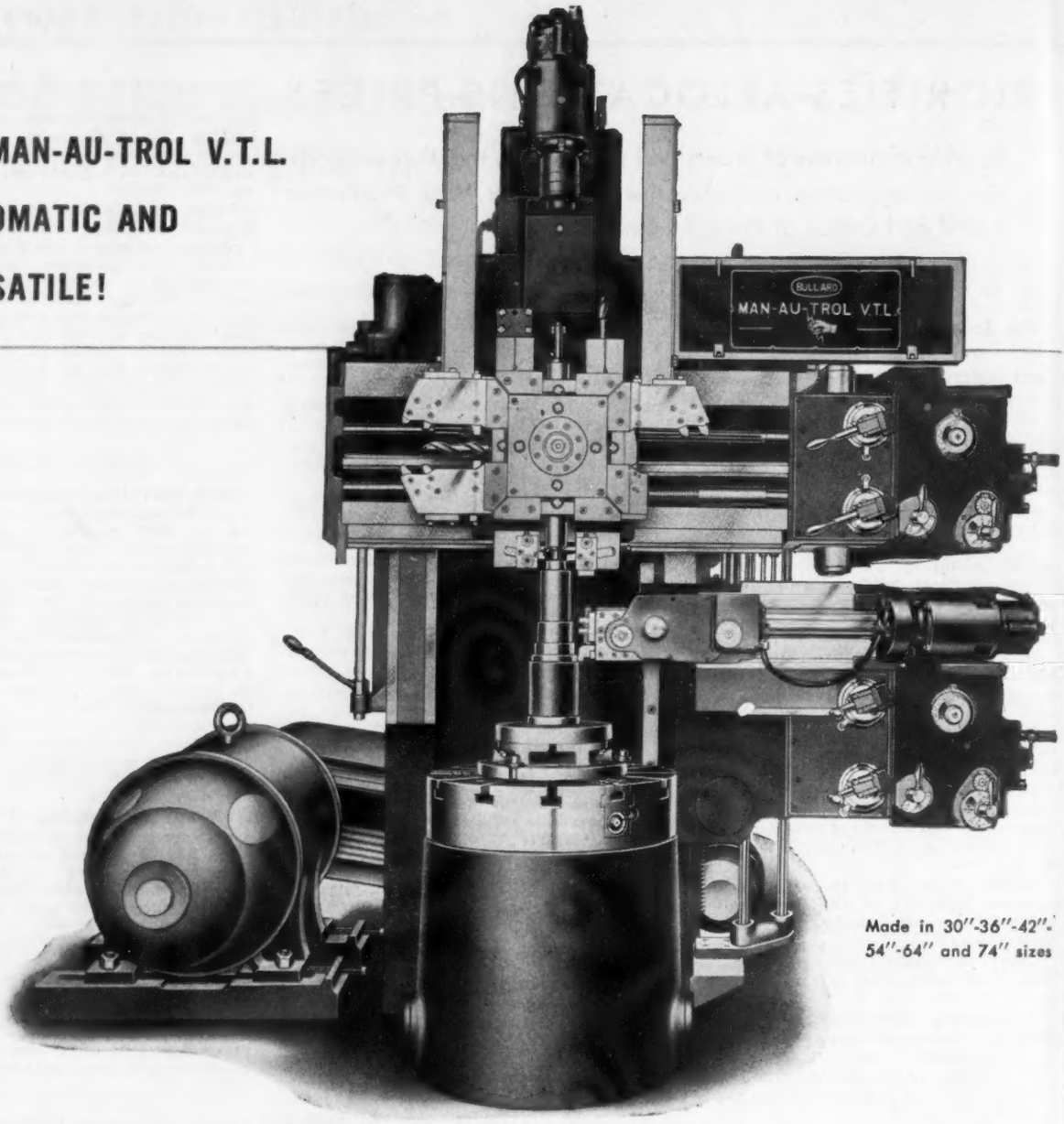

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BULLARD CREATES *NEW METHODS* TO MAKE MACHINES DO MORE

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Suppliers find selves in quandary as first releases of production parts for passenger cars are made without authorizations for scheduling. Fisher brothers reveal move to acquire interest in Hudson Motor Car Co.

FIRST releases of production parts for passenger cars have been made, and in their wake has developed a considerable degree of confusion. Suppliers, accustomed to following the rules and regulations of CMP procedure, are confronted with shipping instructions on quantities of automotive material, and are asking where their authorization is to schedule this production. In reply, the buyers say, in effect, "Well, don't you know the war is over? Don't you read the papers? Let's go."

One of the principal body sources has released 20 per cent of the orders placed some time ago, with shipments to start 30, 60 and 90 days from the so-called X-Day which is apparently May 19. This would mean first shipments around June 19, but in view of the fact the open-ending of CMP is not scheduled until July 1, the quandary in which suppliers find themselves is understandable.

There is considerable speculation as to why the official relaxation of controls and other reconversion steps has been deferred until July 1. The most obvious explanation is that it was felt advisable to soft-pedal reconversion talk until the conclusion of the seventh war loan drive to avoid any possible slowing effect on bond sales. After July 1 it is expected there will be a concerted attempt to accelerate the entire process of civilian goods manufacture.

Fishers' Offer Turned Down

Stockholders' meeting of Hudson Motor Car Co. last week finally brought into the open the moves which the Fisher brothers have made in the direction of acquiring that company. Probably in the knowledge of what would develop at the Hudson meeting, the Fishers arranged a press conference the Saturday preceding, at which they explained their approach to Hudson was in the nature of a small-town flirtation and not necessarily indicating any conclusive deal for acquiring the company. At the Hudson meeting it developed the Fishers had made an offer to purchase 400,000 unissued shares of the company's common stock at the book value of $22.51 per share, but the offer was refused. A. E. Barit, Hudson president, appeared to be opposed to the Fisher offer, although other shareholders present urged consideration of the proposal.

Insiders believe a battle for control of Hudson is under way between the Atlas Corp. interests who have been buying Hudson stock and the Fishers who have been making purchases as well through their investment firm, Fisher & Co. Under protest, and with less than 50 per cent of the stockholders represented, the Hudson meeting went through as scheduled, and two new directors were elected, replacing the vice president in charge of purchasing and the vice president in charge of manufacturing who have been board members. Carston Tiedeman, regional director of the WPB and claiming to be spokesman for some 3800 shares of Hudson stock, protested the proceedings and urged the offer be considered further.

Methods that cut many months off the automotive industry's conversion to war production in 1942 will be used again in speeding reconversion and reemployment. Automotive companies have initiated a self-aid plan for locating urgently needed reconversion machine tools and other industrial equipment. Under the plan, any company requiring hard-to-get machine tools may list its needs with the automotive council's machine tool listing service, which at regular intervals will circulate the complete list among all of the Automotive Council for War Production's more than 525 member companies. These, in turn, will check the master list against their own lists of idle or soon-to-be-idle equipment in their plants and immediately notify the listing service of the availability of any specified machinery that can be spared from war work and which will be available for purchase by the company in need.

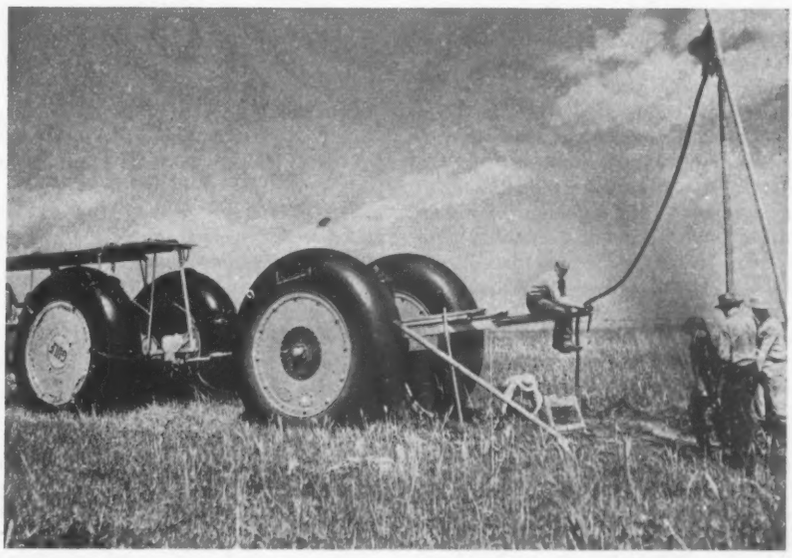
Negotiations for the purchase of such equipment will be handled directly by the companies concerned or by the prospective purchaser and the government agency that may have title.

All that is needed for the plan to become operative is for the military services to waive their directions which now forbid any war contractor to divulge information to any outside company or individual concerning idle government equipment in his plant.

While the machine tool listing service is to be conducted primarily for automotive council members, firms outside the auto industry also can participate on an equal basis with ACWP members.

The machine tool listing service is to be a streamlined version of the automotive council's post-Pearl Harbor machine tool listing service which made possible the quick location of more than 13,000 machine tools early in 1942 when the builders of such equipment were snowed under by war orders. Again last winter when ordnance ammunition and artillery programs were expanded greatly, the council developed a simplified plan which enabled the industry to locate in the Detroit ordnance district more than a third of the machine tools needed nationally for these programs.

The industry's reconversion also will



TIRES FOR AMPHIBIAN: Tires four feet taller than the height of the average man are used to equip an amphibious vehicle for oil exploration in Central America and southern United States. The tires, made by Goodyear, are ten feet high and 5½ feet in diameter. Access to this spot in Louisiana swamps where a Gulf Oil exploration crew is at work would have been practically impossible without the marsh buggy

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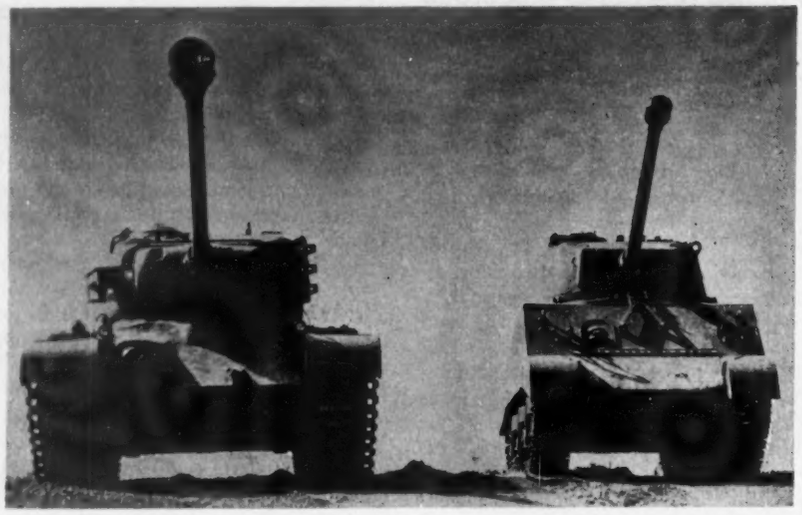

PERSHING TANK: The two tanks shown above are the 45-ton M-26 General Pershing, left, and the standard 32-ton General Sherman, right. The Pershing has a lower silhouette, wider treads and wider body. It carries a 90-millimeter gun, compared with the Sherman's 76-millimeter weapon, has more armor plate and is more maneuverable in mud and sand. The M-26 was designed by the Army Ordnance Department in co-operation with Chrysler Corp. and General Motors Corp.

be speeded through continuation of the automotive council's tooling information service, which each week compiles information regarding the available capacity of more than 200 tool and die companies for making tools. This information permits tool buyers immediately to get in touch with shops having facilities available to handle such work. This service has been of great value throughout the industry during the war period.

A $2,500,000 program designed to facilitate the resumption of automobile production has been announced by Studebaker. The expenditure covers the razing of 13 old structures on the main plant site, some rearrangement of manufacturing layout and the construction of a modern building which with covered loading dock will provide approximately 250,000 square feet of space.

Also involved is the erection of a large temporary storage building with lumber salvaged from the wrecked structures. This will eventually be used to house equipment and parts discarded by the termination of war contracts. No date for completion of the program has been given, but it is planned to have facilities ready by the end of this year.

Virtually all of the structures slated for leveling date back to Studebaker's carriage and wagon days. Two were built in the early seventies. Another was a result of a contract in World War I.

The principal new building will be used for the manufacture of truck cabs and pickup bodies. It will be an L-shaped, two-story reinforced concrete structure and be located adjacent to the present body shops. The stem of the "L" will extend 635 feet by 100 feet. The shorter section will measure 125 x 125 feet. The roofed-over loading platform will be built between the new unit and the body shops.

Production schedule agreements tentatively reached at WPB's May 16 meeting of its automobile industry advisory committee call for 215,000 passenger cars by the end of 1945, 430,000 in first quarter of 1946 and 2,150,000 in first year of resumed output. Contrary to public reports, this program was suggested by government representatives who insisted steel outlook would not permit a larger program. Industry committee members accepted after assurances were given that steel supply will be constantly revised and constantly reviewed and present car quotas increased as more steel becomes available.

WPB informed the meeting, attended by representatives of truck and parts advisory committees as well as by passenger car company officials, that all restrictions on production of parts will be lifted in immediate future. It also announced that a meeting of the truck advisory committee would be called shortly to develop plans to increase output, particularly of medium and light commercial units. These WPB plans, subject to revision after discussion of them with WPB's automotive labor advisory committee, announcedly will be revised as materials supply conditions and other production factors change in coming months.

Limitation order L-158 is in process of modification. All restrictions will be revoked and production may proceed on an unlimited basis, both for functional and nonfunctional parts. Present list of defined parts will be retained in L-158, however, and producers of these items will be given additional assistance on priorities and firm CMP allotments. Dealer inventory restrictions will be eliminated.

On the basis of WPB's figures of steel tonnage to be available in third quarter (ending Sept. 30) industry representatives at meeting accepted initial authorization to produce 215,000 passenger car units this year, with presumption being that all or nearly all of these will reach final assembly in fourth quarter. This "quota" is equivalent to 10 per cent of annual starting rate of 2,146,786 units as set by WPB.

Assurances of obtaining 300,000 tons of steel for passenger car production in third quarter were given the industry with WPB agreeing to study steel availability continuously in order to increase the authorized car production rate at earliest possible moment.

With some assurance of steel deliveries, industry representatives declared individual companies could work out their own problems on all other materials except tires for which no substitutes are available. WPB said it would work with other government agencies and see that tires were available.

Output Quotas To Be Assigned

While no definite output quotas were established at meeting, WPB shortly will assign them to companies individually. Provisions in this allocation plan will permit quota adjustments. Further, an appeals procedure is available for further relief from quota restrictions.

Grand Rapids Stamping division of Fisher Body has been advised that its contract for 155-millimeter shells will be terminated as of June 1. The cancellation of the shell contract, together with other shifts in war production, will affect about 900.

Negotiations are nearing completion for acquisition of a factory site at Herrin, Ill., and if the transaction is consummated, the Norge division of Borg-Warner Corp. will concentrate all laundry equipment manufacture there as soon as a plant can be constructed on the property.

The contemplated acquisition marks another major step in a comprehensive program of plant decentralization deemed necessary to permit the company to meet its announced postwar objectives of high-employment, efficiency, and volume in each of its factories. Last fall, the company announced the purchase of a plant in Effingham, Ill., for electric and gas range output, and the intention to streamline each of its plants for single-purpose, straight-line production. Muskegon and Muskegon Heights, Mich., factories will manufacture electric refrigerators and develop new products.

Check these Features of VICKERS Variable Delivery PISTON TYPE PUMPS

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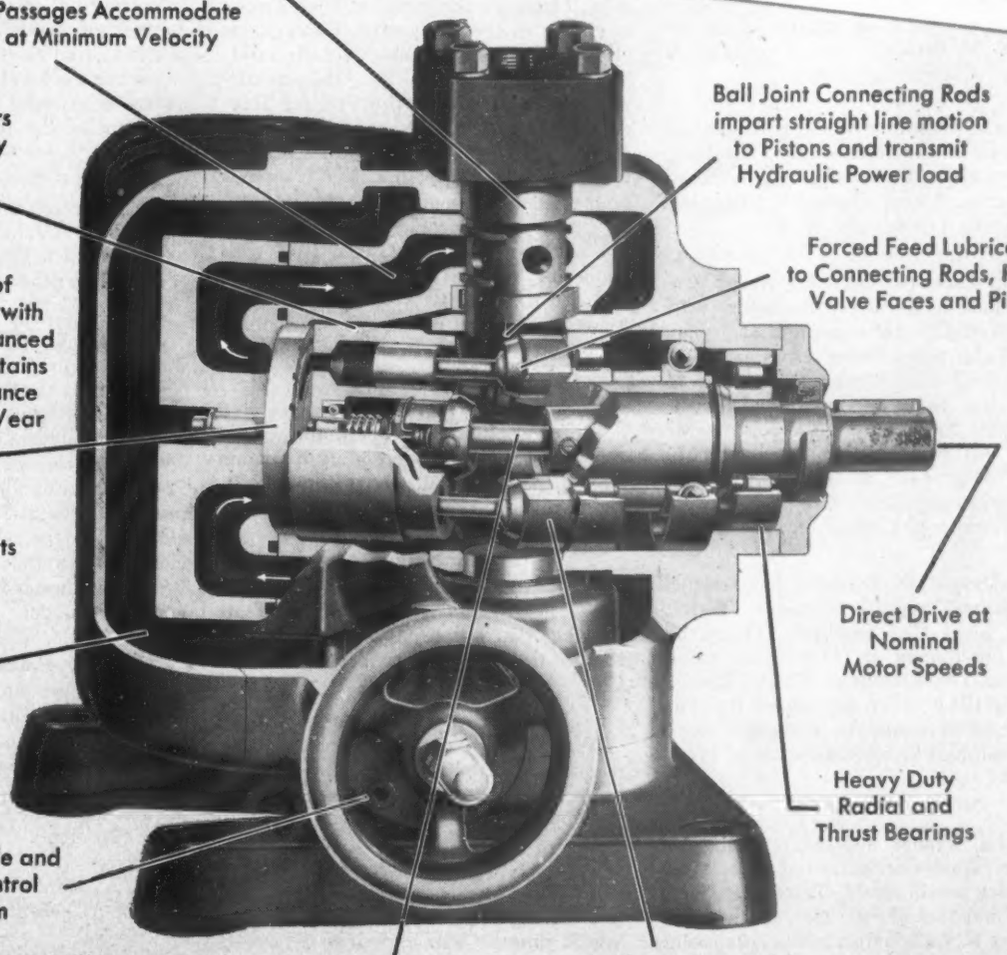
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MEN of INDUSTRY

CHARLES P. CUTLER

H. THOMAS CAHRAMAN

NOLAN E. WATKINS

Charles P. Cutler has been appointed Chicago district manager, Republic Steel Corp., Cleveland, succeeding **Mowry E. Goetz** whose appointment as assistant to the vice president in charge of operations, **E. M. Richards**, was announced in the May 21 issue of STEEL.

—o—

Carl N. Osborne, vice president and treasurer, M. A. Hanna Co., Cleveland, has been elected a member of the board of directors, Durez Plastics & Chemicals Inc., North Tonawanda, N. Y.

—o—

M. E. Haas has been appointed general manager of sales, Reynolds Wire Co., Dixon, Ill. He was previously manager, Tube Sales Order Division, Pittsburgh Steel Co., Pittsburgh. **James H. Gregg** has been appointed assistant to the vice president of Reynolds. Mr. Gregg was formerly associated with the Gregg Mfg. Co., St. Paul, Minn. and later was president, Gregg Mfg. Co. Ltd., Winnipeg, Canada.

—o—

Dr. Donald D. Kennedy has resigned as assistant general manager, Farrell-Cheek Steel Co., Sandusky, O., to accept appointment as chief, Commodities Division, Department of State. Prior to Jan. 3, 1944, when he joined the Farrell-Cheek company, he was price executive, Iron and Steel Branch, OPA, Washington.

—o—

Ernest Franks has been placed in charge of sales of industrial wheel tractors and power units, Tractor Division, Allis-Chalmers Mfg. Co., Milwaukee. **Charles F. Codrington** has been appointed assistant to the manager and **A. E. Caudle** has been appointed sales manager of the company's blower and compressor department.

—o—

Lieut. Col. Hubert E. Snyder, recently returned to inactive status in the Army, has been appointed vice president in charge of Corrugated Metal Pipe Division, Penn Metal Corp. of Pennsylvania, Philadelphia. He was formerly vice president and general manager, Shelt Co., Elmira, N. Y.

—o—

H. Thomas Cahraman has been placed in charge of the Bridgeport, Conn., sales office, Aluminum Division, Reynolds Metals Co., Richmond, Va. He was formerly associated with the Federal Telephone & Radio Co., Newark, N. J., and prior to that with Ford Motor Co., Detroit. **Joseph E. Collins** has been appointed plant manager, Reynolds' Foundry Division, Springfield, Mass. Mr. Collins has been associated since 1924 with Aluminum Co. of America, Pittsburgh, and for the last 10 years was superintendent of the company's permanent mold and sand foundries in Detroit.

—o—

Carl W. Bettcher has been elected president, Eastern Machine Screw Corp., New Haven, Conn., succeeding **Benjamin Green,** chairman of the board. Mr. Bettcher will also continue to direct sales and advertising.

—o—

Dr. C. R. Austin, professor of metallurgy, Pennsylvania State College, State College, Pa., has been appointed assistant to the president, Meehanite Metal Corp., New Rochelle, N. Y.

—o—

W. G. Lewellen has been appointed director, distribution staff, General Motors Corp., Detroit, succeeding **Nelson C. Dezendorf.** Mr. Lewellen also will be chairman of the distribution policy group, succeeding **Albert Bradley,** executive vice president. Mr. Dezendorf will continue his present duties until June 15, at which time he will undertake a new assignment. **Thomas F. Brown,** Chevrolet regional sales manager at Kansas City, Mo., will succeed Mr. Lewellen as assistant general sales manager of the Chevrolet Division in charge of parts and accessories merchandising, warehousing and distribution, as well as general manager of the GM Parts Division.

—o—

Earl F. Gregg has been appointed sales engineer, electrical tapes, in the eastern division, Minnesota Mining & Mfg Co., St. Paul, Minn.

—o—

Nolan E. Watkins has been appointed director of safety, Gary sheet and tin mill industrial relations department, Carnegie-Illinois Steel Corp. He formerly served as assistant to the division superintendent of the tin mill.

—o—

Albert F. Polk, vice president in charge of engineering, Sheffield Corp., Dayton, O., has been selected by the War Department for a mission in the American-occupied territory in Europe.

—o—

Clarence L. Collens, chairman, Reliance Electric & Engineering Co., has been elected president of the Associated Industries of Cleveland, composed of industrial employers in Cleveland. He succeeds **Walter L. Seelbach,** secretary, Forest City Foundries Co. **R. V. Mitchell,** president, Harris-Seybold-Potter Co. was elected vice president; **George S. Case,** chairman, Lamson & Sessions Co., treasurer; and **Chester Nikodym,** secretary and general manager.

—o—

Alvin F. Franz has been appointed general superintendent of Wickwire Spencer Steel Co.'s Buffalo plant. For 15 years previously he was general superintendent, Alan Wood Steel Co., Philadelphia. Prior to that he was open hearth superintendent of the Otis Steel Co., Cleveland.

—o—

M. A. Hardie has been elected treasurer of ACF-Brill Motors Co., New York.

—o—

A. Hugh Philpot has been elected vice president and managing director of the newly formed export division of Copperweld Steel Co., Warren, O. The new division, Aristoloy Steel International Co., is located at 815 Fifteenth street, Washington. Mr. Philpot continues to be assistant to **S. E. Bramer,** president of Copperweld.

—o—

Julian D. Dickerson of Republic Steel

J. H. GULICK

J. P. McGOUGH

GWILYM A. PRICE

Corp., Cleveland, has been elected chairman of the Buffalo chapter, American Society for Metals, succeeding **George B. Michie** of Electro Refractories & Alloys Corp., Buffalo. Other officers are: **Eugene A. Gietzen,** vice chairman; **John H. Birdsong,** secretary; and **Emil M. Galbreath,** treasurer. New directors are **John T. Carroll, Charles O. Bergess** and **Ray C. Spencer.**

—o—

J. H. Gulick, formerly director of purchases, Lempco Products Inc., Cleveland, has been promoted to general factory manager of Lempco's main plant in Bedford, O. He will continue for the time being to serve also as director of purchases.

—o—

Ellwood B. Nelson has been appointed assistant general superintendent, Coal Mine Division, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala. **Peter S. McCrorie** succeeds Mr. Nelson as superintendent of the company's Edgewater mine.

—o—

C. O. Bartlett & Snow Co., Cleveland, has announced the transfer of **John J. Watson** to the Detroit sales office. He has been with the company for more than eight years in the Cleveland engineering, sales and service departments.

—o—

Robert H. Barlow has been appointed plant engineer, General Motors Corp.'s Oldsmobile Division, Lansing, Mich. Formerly assistant plant engineer at Oldsmobile, he was transferred to the Fisher Body Division in 1942 to serve as plant engineer in charge of construction and maintenance at the Fisher aircraft plant erected in Cleveland for bomber production.

—o—

Timothy E. Shea, formerly chief engineer, Electrical Research Products Division, Western Electric Co. Inc., New York, has returned to the company following four years' service as director of research, Columbia University Division of War Research, New York. Mr. Shea has been appointed superintendent in charge of manufacturing engineering at the company's vacuum tube shop.

—o—

J. P. McGough has joined the Betz Pierce Co., Cleveland, as manager of sales. Mr. McGough has had 27 years experience in handling steel through warehouse channels, the last 20 years of which have been in Cleveland.

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W. R. Toeplitz has been elected vice president in charge of engineering research, Bound Brook Oil-Less Bearing Co., Bound Brook, N. J.

—o—

Benjamin Sweedler has resigned his position with Semet-Solvay Co., New York, to open his own offices to serve the coke, gas and process industries in patent and related matters.

—o—

T. W. Atkins, former assistant vice president, Defense Plant Corp., Washington, has been appointed executive vice president, Magnesium Association, New York.

—o—

Robert K. Clark has retired as manager, George M. Clark & Co., Harvey, Ill., division of American Stove Co., St. Louis. He is being succeeded as manager by **Harold B. Isaac,** general superintendent.

—o—

H. B. Paul has been placed in charge of manufacturing, Conlon Corp., Chicago. He was formerly general manager, Libby Machine Tool Mfg. Division, Indianapolis, International Detrola Corp., Detroit.

—o—

Earl D. Beason, formerly assistant plant manager, Rheem Mfg. Co., Birmingham, Ala., has been assigned to explore the market for new products for postwar manufacture.

—o—

Albert Leigh Taylor has been appointed Canadian sales manager, Weatherhead Co. Ltd., St. Thomas, Ont., Canada. He was formerly manager of material and production control, Central Aircraft Mfg. Ltd., London, Ontario.

—o—

Gwilym A. Price has been appointed executive vice president, Westinghouse Electric Corp., Pittsburgh. His responsibilities as vice president and director had included settlement of the company's war contracts. Westinghouse has appointed **Lee C. Bennett** central station manager, middle Atlantic district, and he will retain the position of marine manager for the same district; has transferred **W. E. Lee,** formerly of the Los Angeles application engineering department, to the Phoenix, Ariz., office as application engineer; has appointed **John J. Hayes,** Pacific Coast district treasury manager.

—o—

Briggs Clarifier Co., Washington, has appointed **Charles W. Miller Jr.,** formerly president, Aircraft Enterprises Inc., Bridgeport, Conn., as a member of Briggs' engineering staff. The company has also appointed **E. Digges La Touche** to administer the field service engineering staff of the Aviation Division. Mr. La Touche was previously executive assistant to the director general of the British Air Commission.

—o—

Stephen T. McGinnis, who has been in the armed forces for the past three years, has returned to his position as assistant director of public relations, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

—o—

O. S. Linderose has been appointed manager, Rite-Way Tool & Mfg. Co., Detroit. He formerly was with the Trio Tool Co. and prior to that with Chalmers Motor Car Co., both of Detroit, and North East Electric Co., Rochester, N. Y., General Motors of Canada, Ford of Canada, and Pressed Metals Co. of America Inc., Port Huron, Mich.

—o—

Pearson E. Neaman has been elected vice president, Freeport Sulphur Co., New York, and its subsidiaries, including

Cuban-American Manganese Corp. and Nicaro Nickel Co. Since 1930, he had been secretary of the parent company in charge of all legal activities.

—o—

Lloyd B. Smith has been elected vice president and member of the board of directors, A. O. Smith Corp., Milwaukee. **Morris J. Vollner** has been elected assistant secretary and assistant treasurer, and **A. von Wening,** vice president and controller, has been elected to the board of the company.

—o—

Dr. Norman R. Gibson has been elected senior vice president of the Buffalo, Niagara & Eastern Power Corp., Buffalo. **Edwin S. Bundy** was named chief engineer while **Albert T. O'Neill,** chief counsel, and **Arthur W. Jackson,** treasurer, were elected vice presidents.

—o—

Arthur Terry, head of Contract Engineering Division, Dorr Co., New York, has been appointed by the Foreign Economic Administration to administer that agency's rehabilitation activities in Holland and Netherlands East and West Indian possessions.

—o—

Edward J. Whetzle has been appointed advertising manager, International Derrick & Equipment Co., Columbus, O., one of the Dresser Industries.

—o—

Donald M. Nelson, former special adviser to the President and prior to that chairman of the War Production Board, has been elected director, Molybdenum Corp. of America, Pittsburgh.

—o—

James C. Patton Jr., sales engineer in Detroit for Heppenstall Co., Pittsburgh, has been placed in charge of the company's Chicago sales office.

—o—

Henry A. Roemer Jr. has been elected executive vice president, Detroit Seamless Steel Tube Co., Detroit. He was previously assistant general manager of sales, Pittsburgh Steel Co., Pittsburgh.

JOHN D. THOMPSON

Who has been elected vice president in charge of production, John A. Roebling's Sons Co., Trenton, N. J., as noted in STEEL, May 7, p. 95.

ELMER G. GREENE

Who recently was elected senior vice president of the Ferry Cap & Set Screw Co., Cleveland, as noted in STEEL, April 16, p. 98

—o—

John J. Dougherty, Pittsburgh attorney, has been elected to the board of directors, Jessop Steel Co., Washington, Pa. He succeeds **J. Patriek Lannan** of Chicago.

—o—

Raymond E. Birch has been appointed director of research, Harbison-Walker Refractories Co., Pittsburgh, to succeed the late **Fred A. Harvey.** Mr. Birch has been associated with the company since 1930.

—o—

George N. Powell has been appointed purchasing agent, Dravo Corp., Pittsburgh, succeeding Anthony Davia who has relinquished the duties of that position to accept an assignment in a new field of special duties in behalf of the corporation.

—o—

Walter M. Farnsworth has been appointed acting assistant district manager, Central Alloy district, Republic Steel Corp., Cleveland. **E. R. Johnson,** formerly the district's chief metallurgical engineer, succeeds Mr. Farnsworth as divisional superintendent in charge of the Canton Steel Division, blast furnace and coke plant. **O. A. Bamberger,** who has been superintendent of the Massillon steel plant, has been appointed acting divisional superintendent in charge of the Massillon Steel Division, blast furnace and coke plant.

OBITUARIES . . .

Willard Lawson Cumings, 71, geologist for Bethlehem Steel Co., Bethlehem, Pa., since 1906, died May 15. Mr. Cumings was largely responsible for Bethlehem's acquisition of many coal, iron and quarry properties and it was due to his geological work that the large ore body at Cornwall, Pa., was developed.

—o—

Richard M. Hollingshead, 77, president, R. M. Hollingshead Corp., Camden, N. J., died May 15 in Philadelphia.

—o—

Theodore J. Illing, 74, treasurer and auditor, Lamp Division, Westinghouse Electric Corp., Pittsburgh, until his retirement six years ago, died May 15 in East Orange, N. J.

—o—

William H. Chapman, 63, president, the William H. Chapman Co., Newark, N. J., died May 14 in Maplewood, N. J.

—o—

Ross I. Davis, 60, vice president, Hillman Coal & Coke Co., Pittsburgh, died May 14.

—o—

Charles H. Thomas, 60, president, Canedy-Otto Mfg. Co., Chicago Heights, Ill., died recently in that city.

—o—

Courtland C. Secrist, 62, sales manager and director, Victor Mfg. & Gasket Co., Chicago, died May 19 in Hinsdale, Ill.

—o—

John B. Harlow, 61, contract license manager, Electrical Research Products Division, Western Electric Co. Inc., New York, died May 15 in Montclair, N. J.

—o—

Gilbert W. Nigg, 48, general manager, Nigg Engineering Co., Covina, Calif., a steel construction concern, died May 14 in that city.

—o—

Lieut. Col. James L. Luke, 40, who was on leave as treasurer of Cleveland-Cliffs Iron Co., Cleveland, while serving with the Army Air Forces, died May 20 in a fire that damaged his home in Edgemoor, Md., a suburb of Washington.

—o—

John Janitschek, 78, founder and part owner, New Jersey Art Foundry, Jersey City, N. J., died at his home May 20.

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Walter S. McCann, 41, secretary of the Chain Institute, Hand Chain Hoist Institute, Industrial Truck Statistical Association, and acting secretary of the Material Handling Institute, all of Chicago, died May 18 in Cleveland.

—o—

Henry W. Wehr, 72, chairman, Wehr Steel Co., Milwauke, died May 17 in Chicago.

—o—

Harold Eddy Johnston, president, Cohoes Iron Foundry & Machinery Co. Inc., Cohoes, N. Y., died May 15.

—o—

Earl R. Rattray, 55, fleet engineer, Pittsburgh Steamship Co., Cleveland, died May 18 in Ashtabula.

San Francisco Area Metalworking Shops Urge Relaxing of Controls

Immediate lifting of government restrictions urged if wholesale unemployment is to be prevented. More war work or prompt reconversion to civilian production needed. Survey shows much capacity idle

METAL fabricating plants in the San Francisco Bay area are urging immediate relaxation of all governmental restrictions to prevent "wholesale unemployment."

The reasons behind this demand were outlined by M. F. Lowe, secretary-manager of the California Metal Trades Association, an employers group.

"If the workers and employers of this region are going to get anything like a fair deal," Mr. Lowe said, "the government must do one of two things. If more war material is to be produced, let us have contracts fast, for our shops and men are without work. If more material is not wanted from this area, let the government stop strangling us with red tape and let us reconvert to civilian work."

Mr. Lowe said only a third of the San Francisco area's metal shops are working at more than 90 per cent of capacity, and that probably half the people being laid off in shipyards are not going to other work in the district.

Moreover, he said, the shops are not being given orders for war goods and "red tape prevents them from converting to civilian work."

Mr. Lowe said that less than 10 per cent of the association's members are being held up by lack of critical raw materials.

"The chief difficulty in getting supplies is the endless filling in of government forms and the endless waiting until the government says 'yes'."

A survey, he reported, showed only 33 per cent of the association's shops were using more than 90 per cent of full productive capacity; 28 per cent were using 70 per cent to 90 per cent of capacity; 18 per cent were using between 50 per cent and 70 per cent; 13 per cent were using between 30 and 50 per cent; and 8 per cent were using less than 30 per cent of capacity.

Up to now there has been no relaxation of War Manpower Commission labor controls in this area, other than the reclassification of the area from Group I to Group II several weeks ago. However, latest indication is that all labor controls will be removed about July 15, at least temporarily. Later, should reconversion progress create a new demand for workers, controls may be reinstituted.

Meanwhile, reduction in employment in private shipyards continues. Wholesale layoffs still are scheduled for August and September. From a wartime peak of about 270,000, private yards in the San Francisco area have reduced payrolls to about 80,000 at present and by next November the number is expected to shrink to about 10,000. Most of these will be doing repair work.

Indications are that about 25 per cent of the workers being let out in the shipyards are moving away from this area. Prospects for shipbuilding activity on the West Coast after Japan is beaten still are not clearly defined. However, there is expected to be considerable reconverting of Maritime Commission vessels into passenger liners and peacetime cargo carriers.

PROMOTE WESTERN STEEL: Members of the Western States Council's steel committee are presenting a united front in a program to obtain more and cheaper steel for the 11 western states. Shown above at a recent meeting in Los Angeles, the committee members are, left to right, front row: E. L. Soule, president, Soule Steel Co., San Francisco; John R. Simplot, Simplot Dehydrating Co., Caldwell, Idaho; Kenneth T. Norris, chairman of the committee and president, Norris Stamping & Mfg. Co., Los Angeles; J. I. Hemmings, Southern California manager, American Forge Co., Berkeley, Calif.; Fred Robbins, Plomb Tool Co., Los Angeles. Rear row: John E. Barber, executive assistant to the president, Consolidated Steel Co. Ltd., Los Angeles; Charles Cook, vice president, Isaacson Iron Works, Seattle; C. J. Daiss, general manager, Moore Machinery Co., San Francisco; William C. Schmitt, president, Schmitt Steel Co., Portland, Oreg.; Clark D. Carpenter, professor of metallurgy, Colorado School of Mines, Golden, Colo.; F. T. Letchfield, consulting engineer and assistant vice president, Wells Fargo Bank & Trust Co., San Francisco; James F. Bone, committee secretary

WING TIPS

Wise disposal of surplus property held essential to growth and progress of industry. Many weapons of World War II cannot be useful as standby power for possible future conflicts. Retention might block new developments

By E. E. WILSON*

UNITED STATES air power now finds itself approaching the situation that existed at the end of the last war. It is entirely possible we may repeat the catastrophe of that war. The American people having seen the armed forces exercise a decisive influence in the outcome of this war, and seeing air commerce on a sound, economic basis, and having noted also the American aircraft industry as the largest industry in the world, seem to take it for granted all this is bound to survive. Nothing could be further from the truth. Unless positive steps are taken promptly the American manufacturing industry, the cornerstone of American air power, is threatened with extinction.

In order to appreciate this fact we must understand the whole problem. Reconversion from full wartime operation to full peacetime operation, difficult enough for any industry, is particularly so for aircraft.

As one example of interesting contrasts let us take the automobile industry, and compare it with the aircraft industry. The automobile companies entered this war with strong reserves created out of peacetime earnings. The aircraft industry was nearly insolvent at the outbreak of the war. During the war the automobile companies under renegotiation and the revenue codes, were able to earn twice as great profit from the sale of aeronautical products as did the creators of these products—the basic aircraft industry. So low was the percentage of profit earned by the aircraft industry that its entire capital reserves amount to but a few days operating costs.

The aircraft industry has been blown up to 15 times its prewar size and must be drastically deflated. The automotive industry can convert to approximately its wartime strength. The automotive industry will convert to the greatest pent-up demand in history. The aircraft industry faces an overwhelming surplus of goods and plants. It cannot possibly survive this ordeal unless drastic steps are promptly taken.

There are many complicated problems involved. Consider just one as an example. Take the matter of surplus property and surplus plants. If the government tries to operate the surplus plants in competition with private industry, private industry will be destroyed, because the government is largest customer of the aircraft industry and no manufacturer can compete with his customers. If surplus products are allowed to overhang the market or are dumped upon it there will be no outlet for aircraft products.

Companies will be forced to discharge their highly trained engineers and skilled workers. Once these production and design teams are broken up and the priceless technological training and experience is dispersed, they can never again be restored. Technological know-how will be lost forever. Surplus property must be disposed of in a manner designed to foster American air power rather than throttle it. The public interest demands that disposal procedures aid in providing future employment in a sound domestic economy rather than seek maximum recovery of capital or other expenditures made in prosecution of the war.

At first glance people are inclined to look at brick and mortar and machine tools as real assets. It is entirely possible that an old company or a new enterprise would do better in the long run to abandon war surplus plants and build new ones designed for economical peacetime operations. If free competition prevails they might not be able to employ some war-built surplus plants even if they were given them.

These plants were not designed for a peacetime economy and cannot compete with new plants so designed. These plants are worth no more than their use will warrant. They are but little different than the materials expended against the enemy. When used to save American lives or retain our freedom, they served their maximum usefulness. They must be disposed of with an eye to future employment in a sound economy, not with the desire to squeeze the last dollar out of the process of liquidation.

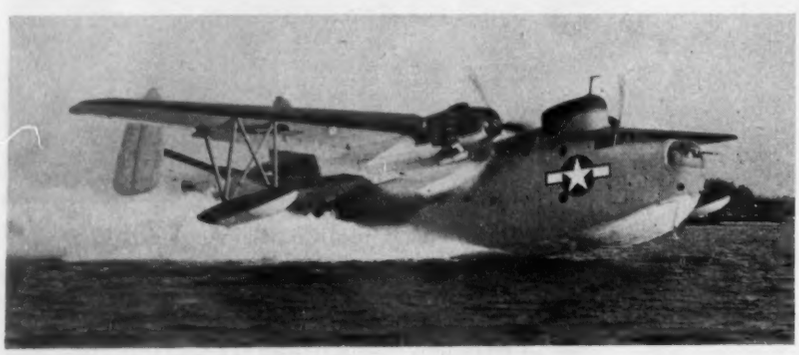
Unwise Surplus Disposal Hurt France

In confirmation of this statement we have the record of the French aircraft industry following the last war. Unwise disposal of surplus war aircraft combined with nationalization and other unwise procedures reduced the French air power from its position of world supremacy in 1918 to a position of complete impotency in 1939. Of all the mistakes made in France, the surplus disposal was the greatest. Nearer home we recall that the American aircraft industry was practically destroyed through the surplus of wartime Liberty engines and wartime aircraft. It is, perhaps, not too much to say that surplus property disposal is the key to the future of American air power.

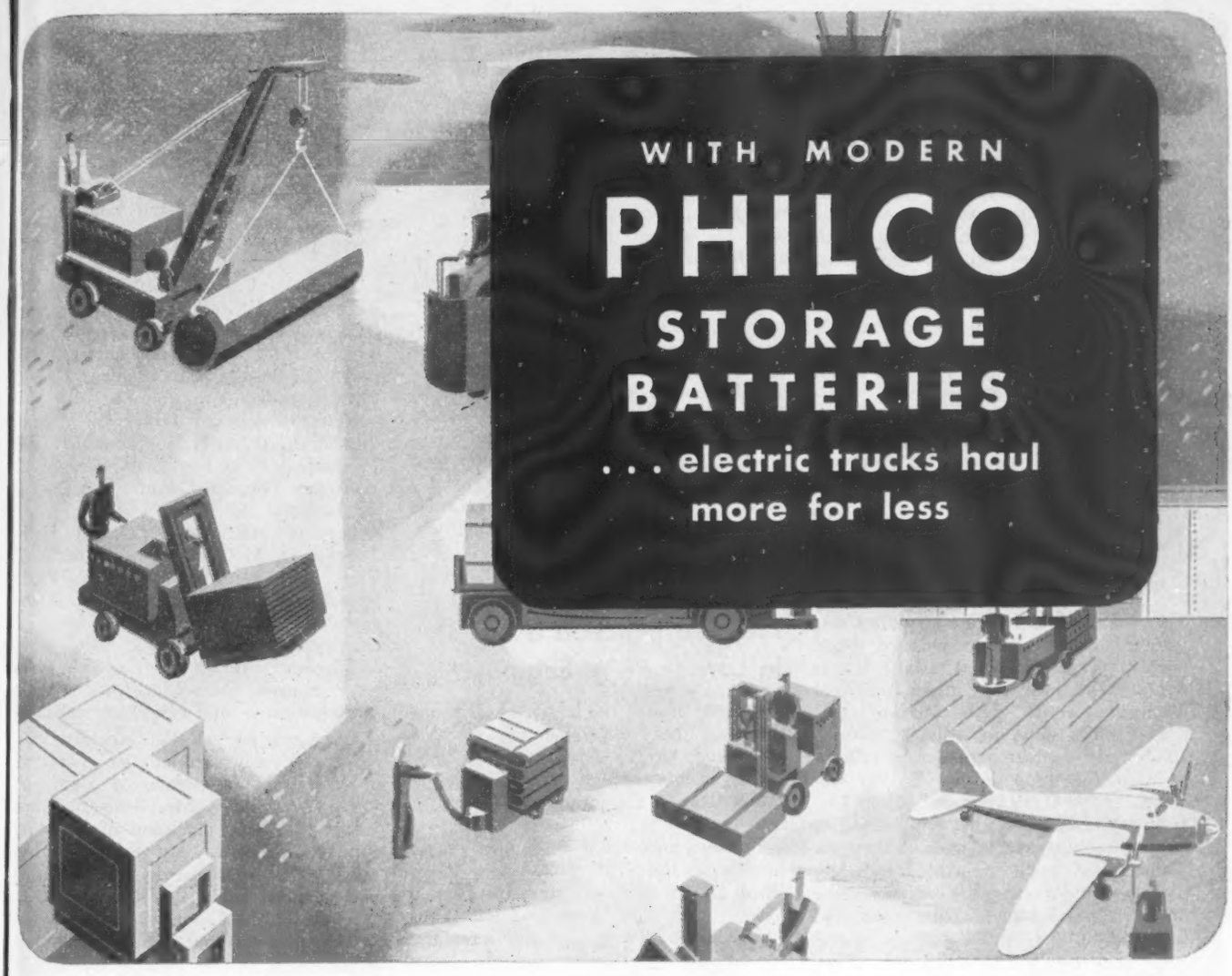
The public generally looks at war products as possessing salvage value. They feel the same way about the surplus plants. The cold-blooded fact is that we now possess a surplus of these products, because we did not have the wit to keep strong enough in the 1930's to make it unattractive for the Germans and Japanese to seek the conquest of our territory and trade. The excess of aircraft and plants which constitutes practically all of our surplus must be considered just as expendable as the shells that hurtled across the Rhine or as the rockets that zoomed into Iwo Jima and Okinawa. If we attempt to salvage this property, and in the process halt normal production, we will quench the spark of technological development and extinguish our air power.

For one of the great demonstrations of this war is the decisive character of advanced technology—no second place weapon is any good. And once having lifted the lid of this Pandora's box, if we fail to keep in the forefront of technical development we will be just helpless next time out. No strategic reserve of World War II will be of any use to us. This fact, true enough at any time, is expressly so

*From an address made at the Chicago Forum on Aviation, May 15. Mr. Wilson is vice chairman of United Aircraft Corp. and president of the Aeronautical Chamber of Commerce of America.



NEW MARINER: Currently in production at the Glenn L. Martin Co., Baltimore, is the new and more powerful Martin Mariner, the PBM-5, which already has seen combat action in the Pacific. Jet-assisted takeoffs are employed by the new Mariner, reducing takeoff runs from 33 to 60 per cent



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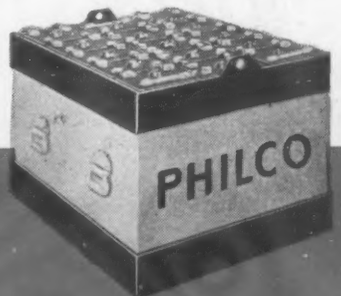


Typical Philco Electric Industrial Truck Battery in Steel Tray

at this time, because never before in history have we ever faced such rapid technological development. This is forecast by rockets and robombs. German models have lacked accuracy, but there is no reason why self-propelled projectiles should not also be self-directing. The magic of electronics and radar has shown the way to self-propelled projectiles which will seek out their target and destroy it. The Germans have been working on such things for twenty years.

This will require the attention of all American research—governmental, institutional and industrial—particularly industrial. Industrial research is productive research—a vital military and economic asset. Its spark plug is competition.

Possibilities of Boosting Engine Power Discussed

Power plant of future heavy-duty motor vehicles may be a combined diesel engine, supercharger, and turbine, it was suggested recently at a diesel fuels and lubricants meeting of the St. Louis section, Society of Automotive Engineers.

The engine-supercharger-turbine combination was proposed by R. W. McLaughlin and C. F. Harms of Elliott Co. Jeannette, Pa., as an effective method of putting exhaust gas to work. They explained that application of the supercharger would increase the engine's power output approximately 50 per cent, and that the turbine would perform useful work in driving the supercharger. They added that future possibilities include utilization of the diesel engine merely to function as combustion chamber for the turbine and to drive the supercharger, with the turbine becoming the source of power.

F. Glen Shoemaker and H. M. Gadebusch of Detroit Diesel Engine Division, General Motors Corp., Detroit, reported that automotive diesels promise to produce fuel savings of 25 to 30 per cent and to provide up to 25 per cent more reserve power for acceleration and hill climbing. However, W. M. Holaday and W. S. Mount of Socony-Vacuum Oil Co. Inc., New York, warned that postwar prices of diesel fuels and lubricants are likely to be higher than they are now. They explained that the growing use of mobile diesels calls for storage and delivery facilities throughout the country, and the increasing volume is likely to rob diesel fuels of their pre-war "free rides in barges, tanks, pipelines and trucks of the heating oil or industrial oil distributing systems."

Pressure Injection Used In Larger P&W Engines

At least nine of the larger engines produced by the Pratt & Whitney Division of United Aircraft Corp. now are supplied gasoline through pressure injection rather than by the former float-type carburetor.

Pressure injection is being used on six models of the Pratt & Whitney Twin Wasp and on three models of the Double Wasp. Only the Wasp and the Wasp Junior of the P&W line still have the former float carburetor and the latter two types of engines are used principally in trainer planes.

The fact that pressure injection now is so widely used in aircraft engines explains the tremendous expansion in the fuel injection business of such companies as American Bosch, Springfield, Mass.

Firth-Sterling Steel Co. Has Four New Directors

Election of four new directors of Firth-Sterling Steel Co., McKeesport, Pa., and retirement at their own request of three long-time members of the board has been announced by L. Gerald Firth, president.

New directors are Irving W. Wilson, Pittsburgh; Arthur H. Bunker and Harold J. Szold, both of New York; and A. C. Wickman, Toronto, Canada, and Coventry, England.

Directors retiring are Lewis J. Firth, Thomas D. McCloskey and Donald G. Clark, all of Pittsburgh. Mr. Firth, founder of the company, retires at the age of 87 after more than 70 years of activity in the tool steel industry. Mr. McCloskey will continue as the firm's legal counsel. Mr. Clark will remain in an executive and consulting capacity.

Of the newly elected directors, Mr. Wilson is vice president in charge of operations and a director of Aluminum Co. of America. Mr. Bunker retired recently as vice chairman of the War Production Board. Mr. Szold has had many years experience in merchandising and financial fields. As head of A. C. Wickman Ltd., Coventry, England, Mr. Wickman is credited with leadership in development of the carbide industry in England and Canada.

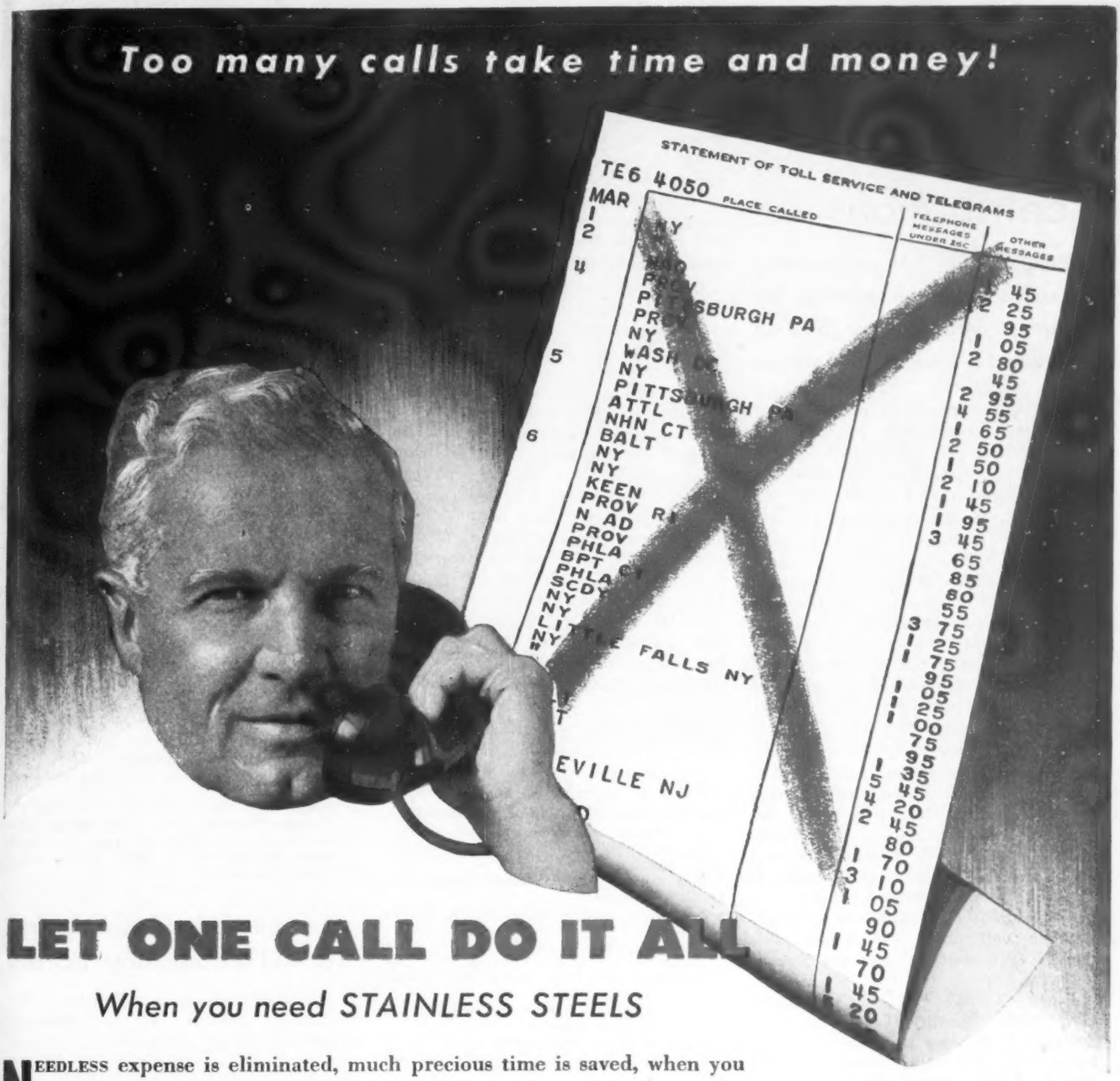
Re-elected to board membership were L. Gerald Firth, James W. Kinnear Jr., and William Loach.

Southern California Co-operative Wind Tunnel Uses 1500 Tons Steel

Construction of the Southern California co-operative wind tunnel, financed by four western aircraft companies and operated by the California Institute of Technology, Pasadena, Calif., required 1500 tons of steel and 17 miles of electric arc welding. Walls of the tunnel are steel plate approximately 1 inch thick and the shell of the duct in the vicinity of the fan blades is designed to withstand a radial force of 1,000,000 pounds.

Co-operating aircraft companies are Douglas Aircraft Co. Inc., Consolidated Vultee Aircraft Corp., Lockheed Aircraft Corp. and North American Aviation Inc. Total cost of project was $2,500,000.

The design of the tunnel was worked out after months of research by a Caltech group headed by Dr. Clark B. Millikan, in consultation with engineers of the aircraft builders. The tunnel incorporates the most advanced technical improvements and will provide wind velocities up to more than 700 miles an hour.



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3 Foundrymen Honored for Contributions

Recognition for outstanding service to steel castings industry awarded by Steel Founders' Society of America

THREE foundrymen were honored for outstanding contributions to the steel casting industry during 1944 at the annual meeting of the Steel Founders' Society of America at Chicago, May 18.

Oliver E. Mount, vice president, secretary and treasurer, American Steel Foundries, Chicago, and retiring president of Steel Founders' Society of America, was accorded recognition for his outstanding record during the past three years. He was presented with an engrossed and illuminated parchment scroll setting forth resolutions of the directors expressing appreciation for his services on behalf of the industry.

Claude L. Harrell, vice president, Sterling Steel Casting Co., East St. Louis, Ill., and chairman of the Steel Castings Industry Advisory Committee to the Office of Price Administration, was presented the Frederick A. Lorenz Memorial Medal for 1944. This gold medal is awarded to the individual adjudged by the directors to have made the most outstanding contribution to the general welfare of the industry during the preceding year.

Edwin A. Walcher, vice president, Ohio Steel Foundry Co., Lima and Springfield, O., was presented with the newly created Technical and Operating Medal of the society for 1944. This medal, which was established in late 1944, is awarded annually to the individual adjudged by the directors to have made the most outstanding contribution toward the advancement of the technical and operating development of the industry during the preceding year. It was wrought by the well-known sculptor, Walter A. Sinz. On the obverse side are objects and scenes emblematic of the technical and operating phase of the industry. The reverse side is quite similar to that of the Lorenz Medal and is also struck in solid gold.

This award was made to Mr. Walcher for the demonstration of foundry technique employed in the development of cast steel breech rings for field, naval and aircraft ordnance. These rings were cast in steel to exceed the government's rigid requirements and broke a bottleneck which was occasioned by the inability of the previous method of manufacture to fulfill the demand. Mr. Walcher prepared an elaborate exhibit showing the various steps taken in solving the technical problems involved in producing cast steel breech rings and made the entire record available to the industry for the benefit of all.

A. M. Andorn, executive vice president of Penn Steel Castings Co., Chester, Pa., and president of the Steel Founders' Society of America, made the awards.

AWARDS . . .

Award of the Army-Navy "E" for excellence in manufacture of war materials has been made to the following:

Aircraftsman Co., Inglewood, Calif.
American Can Co., Ammunition Container Corp., Harvey, Ill.
Borg-Warner Corp., Ingersoll Steel & Disc Division, Chicago.
Deutsch & Sons Template Works, Milwaukee.
Ednal Co., Peekskill, N. Y.
Empire Stove Co., Belleville, Ill.
General Motors Corp., Fisher Body Pontiac Division, Pontiac, Mich.
Harding Machine Screw Co., East Liberty, O.
Merco Co., Los Angeles.
Motor Parts Co., Philadelphia.
Pilot Radio Corp., Long Island City, New York.
Pinecastle Boat & Construction Co., Pinecastle and Titusville plants, Pinecastle, Fla.
Rauland Corp., plants 1, 2, 3, and 4, Chicago.
Stewart-Warner Corp., division 1, Chicago.
American Steel & Wire Co., U. S. Steel Corp., Cuyahoga Works, Cleveland.
Westinghouse Electric Corp., Industrial Electronics & X-Ray Divisions, Baltimore.
Paul K. Weil Co., St. Louis.
R. H. Bouligny Inc., Aircraft Division, Charlotte, N. C.
Charles T. Brandt Inc., Baltimore.
Buescher Band Instrument Co., Elkhart, Ind.
Carolina Steel & Iron Co., Greensboro, N. C.
Commercial Equipment Co., Kansas City, Mo.
Hercules Body Co. Inc., Evansville, Ind.
Induction Heating Co., New York.
O. B. McClintock Co., Minneapolis.
Miniature Tool Co., Clawson, Mich.
Modern Steel Equipment Co., Geneva, Ill.
New York Wire Cloth Co., York, Pa.
Pioneer Electric Co., Los Angeles.
Reynolds Metals Co., Richmond plant, Richmond, Va.
Simmons Co., Pacific division, San Francisco.
Superior Foundry Co., Cleveland.
Sylvania Electric Products Inc., Wakefield, Mass.
Union Metal Mfg. Co., Canton, O.
Western Condenser Co., Watseka, Ill.
American Instrument Co., Plant 1, Silver Spring, Md.
Automatic Washer Co., Newton, Iowa.
Batavia Metal Products Inc., Batavia, Ill.
Bay City Shovels Inc., Bay City, Mich.
The Burgess Co. Inc., Cleveland.
Cooper-Bessemer Corp., Grove City, Pa., plant.
Doehler-Jarvis Corp., W. B. Jarvis Division, Grand Rapids, Mich.
The Dominion Electric & Mfg. Co., Mansfield, O.
Grand Rapids Hardware Co., Grand Rapids, Mich.
International Detrola Corp., Detrola Radio Division, Detroit.
Machlett Laboratories, power tube division, Norwalk, Conn.
Midwest Mfg. Co., Galesburg, Ill.
Pacific Rubber & Tire Mfg. Co., Oakland, Calif.
Silman Mfg. Corp., Arthurdale, W. Va.
Western Cartridge Co., United States Cartridge Co., St. Louis Ordnance plant, St. Louis.
Westinghouse Electric Corp., Home Radio Division, Sunbury, Pa.

Goal Exceeded in Campaign To Aid Technology Library

A $50,000 goal in a campaign of the Pittsburgh Section of the American Chemical Society to establish a technology library fund for Carnegie library, Pittsburgh, has been exceeded by $16,195.

The fund is not an endowment but will be used to supplement funds made available regularly to the library.

CLAUDE L. HARRELL

OLIVER E. MOUNT

EDWIN A. WALCHER

Use of Steel in Postwar Houses Gets Attention

Special emphasis is placed upon metal for one-family, shop-fabricated home, research engineer points out

ATTENTION to the use of steel in prefabrication of postwar homes is being brought about by experience and knowledge gained from wartime design, according to Milton Male, research engineer, United States Steel Corp., New York.

Discussing future construction techniques, Mr. Male said that with growing appreciation of advantages inherent in steel, as well as a better understanding of some of its construction limitations, the building industry will doubtless find many new uses for this versatile metal when the war ends. Special emphasis is being laid upon steel for the single-family, shop-prefabricated house, he asserted.

Steel's great strength, he pointed out, offers wide opportunities to designers and architects, especially for house framing, because residential loads are relatively light and that to take advantage of steel's strength, structural members frequently may be made thinner than practicable for other purposes.

Steel Framing Eliminates Shrinking

One of the most important problems in using any material for framing a house, Mr. Male said, is the possibility of dimensional changes. Shrinking and warping are annoying enough during fabrication, he pointed out, but changes after the house is occupied, accompanied by cracking of fine finishes, misfit of doors and windows, opening of wall joints, all entail added maintenance costs. Steel framing eliminates those troubles entirely and gives positive assurance of stability and low maintenance cost throughout the life of a house. As light gage framing members normally are enclosed within the walls or floors of a house, and not exposed directly to weather, the paint coating applied during fabrication or erection provides adequate and permanent protection, Mr. Male asserted.

Easy formability of steel, Mr. Male said, is especially advantageous for house construction, inasmuch as shop fabrication requires only the simplest of equipment. Steel, he declared, not only offers the prefabricator of homes the advantages of strength, durability, dimensional stability, and easy and economical fabrication, but also incombustibility and the consequent reduction of fire hazards, always an important factor in public acceptance.

THREE-TIME WINNER: C. E. Wilson, left, president of General Motors Corp., and Ned H. Dearborn, president of the National Safety Council, are shown with the council's special wartime award for distinguished service to safety, just won by GM for the third consecutive year for "outstanding success in the prevention of accidents"

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

General Motors Corp., Detroit, plans to build as soon as war conditions permit a plant at Wilmington, Del., for assembly of Buick, Oldsmobile, and Pontiac automobiles. The corporation also has purchased near Kansas City, Mo., a site that possibly may be used for assembling those three makes of cars.

—o—

Brush Development Co., Cleveland, has appointed the following new sales representatives: Burlingame Associates Ltd., New York, for eastern New York and northern New Jersey; Morris F. Taylor Co., Silver Spring, Md., for central Atlantic, southeast and southern states; Terwilliger Sales Co., Kansas City, Mo., for Iowa, Kansas, Nebraska, and Missouri; and David M. Lee Co., Seattle, for Washington, Oregon, and Idaho.

—o—

Munitions and Supply Department of the Canadian government has ordered for the United Kingdom Ministry of War Transport twelve 42-foot storing tenders from J. A. Urquhart Ltd., Parrsboro, N. S., and for the Royal Canadian Navy twenty-two 10-foot drop keel dinghies from Coal Harbor Shipyards, Vancourver, B. C.

—o—

Culpeper Foundry & Machine Co., plant, Culpeper, Va., has been sold to G. M. Burgess, Alexandria, Va.

—o—

Edw. S. Christiansen Co., Chicago, has established a showroom, technical library, and office at 831 South Flower street, Los Angeles 14, to further public interest in aluminum and magnesium.

—o—

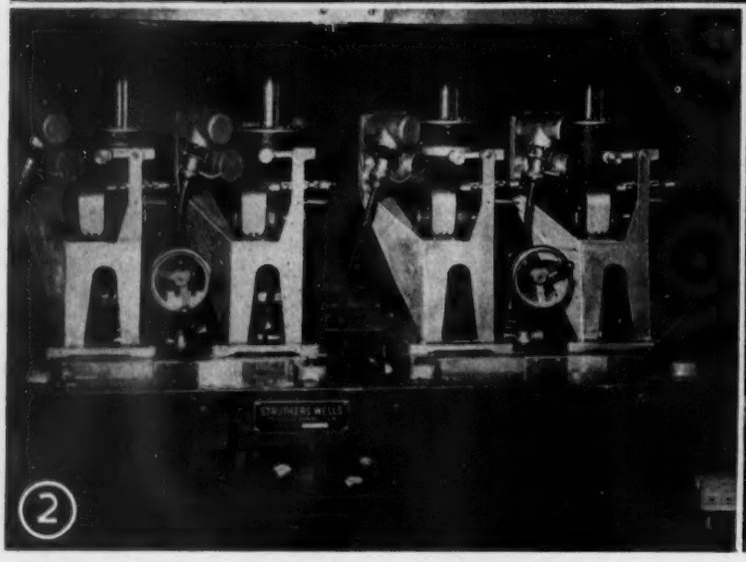
C. J. Schuh Associates Inc., Chicago, business consulting firm, has moved to 105 West Adams street.

—o—

Richmond Radiator Co., Uniontown, Pa., has purchased the sanitary ware plant of General Ceramics Co., Metuchen, N. J. The plant has operated as the Carillon Ceramics Corp.

Electronic Flame Cutter

Radically new system for guiding cutting torches on contour work on steel plate employs plastic records inscribed with full instructions in series of vertical white dashes. "Played back" on machine, and picked up by photoelectric cell actuated by light or projector lamp, records accurately control through drive motors transverse and longitudinal movements of torches



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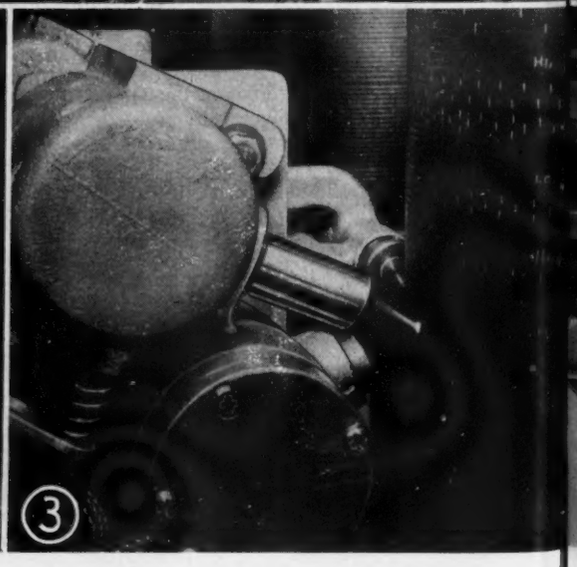


(3)

ELECTRONICALLY speaking, "playing records" on the newest of the automatic flame-cutting machines implies elimination in one fell swoop of many conventional preparatory routines for contour cutting of steel plate.

Duplicate sets of detail drawings for distribution to several operators working on segments of a major fabrication are superfluous. Also, permanent metal templates for duplicate production and transparent tracing overlays for individual pieces become unnecessary insofar as this machine is concerned. Thus, no alignment between work and template is required. Length of layout table supporting work is limited only by space available on shop floor and by number of prepared drum-shaped records on hand.

Conceived and developed jointly by Struthers Wells Corp., Warren, Pa., and Industrial Scientific Co., New York, the machine is fundamentally an oxygen acetylene burning outfit. But the method used to guide torches distinguishes the electronic flame cutter from other existing equipment. This difference is said to open up a broad avenue of possibilities for its application.

The machine moves on a track which is placed between two cutting tables, as shown in Fig. 1. Cutting takes place on both sides. The usual templates are replaced by the drum-like records ensconced within the machine and these move with it. (See Fig. 2). For this reason, it is possible to cut in any location on a long track and alignment is taken care of automatically.

A set of four record drums actuates the flame cutter. They are made of plastic, are light in weight and handy to carry, and can be changed easily. One set provides amply for the largest shapes of any size plate. Several shapes can be combined on one set of records.

Record which actuates the entire mechanism consists of a series of small light dots on a black background. (See Fig. 3). These dots are picked up by photoelectric cells as the record drum turns. Track of the recording is of helical shape, similar to that of a dictaphone recorder; the drums not only turn, but also have a movement in an axial direction. As mentioned, a set of four record drums is used simultaneously (Fig. 2) and these are mounted in pairs, one pair controlling movement of the machine along the tracks in a longitudinal direction, and the other pair controlling movement of the torches along the arm in a transverse direction. These movements are carried out by two electric motors, and the combined movement of these two motors guides the torches in any desired direction so that any contour can be cut. The pair of records which controls each motor comprises (a) a distance record and (b) a direction record. The distance record, as its name implies, controls the distance over which torch will travel in a given time, and the direction record controls the direction, that is, whether the torch travel is forward or backwards in the longitudinal direction or right or left in the transverse direction.

The markings being small light dots, pickup is by photoelectric cell which is actuated by light of a projector lamp that is reflected from the light dots only and not from the black background. There is no physical connection between the records and the pickup and, therefore, no wear, and experience has shown that the records last indefinitely. Of course, if a record should no longer be needed, the surface may be erased and a new coating will make it ready for a new set of shapes.

Control of Operation: Records fully control all the actions of the machine in automatic operation. When a cut is started, the torches are moved by manual

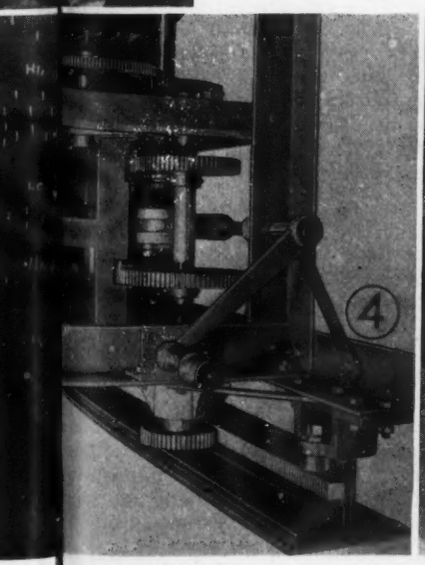
Fig. 1—Overall view of electronic flame cutter in operation

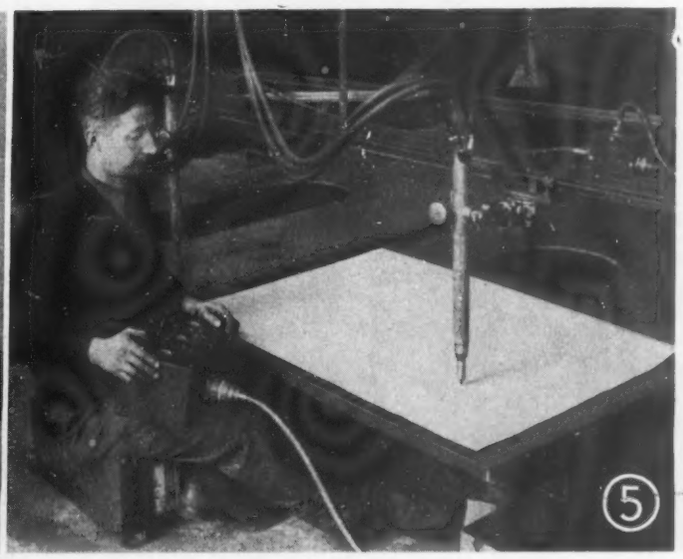
Fig. 2—Customary templates are replaced by drum-shaped records which move with machine and do its "thinking"

Fig. 3—Scanning device containing photoelectric cells picks up message from turning drum and conveys it to drive units

Fig. 4—Carriage to which torch arms are attached moves on a track but is positively controlled by this rack to which records are geared. Every movement of the torch, in transverse or longitudinal direction, is reflected in a movement of the respective record

Fig. 5—Records are prepared by placing drawing at normal location of steel plate. A pointer, substituted for burning torch, is guided by manual push-button control along contours to be cut and a recording made of the actions of two drive motors needed to follow desired contour





push button control to a starting position. A lever then is switched to "automatic" and, upon pressing a button, the torches will start their course as prescribed by the records. Ordinarily, there are four torches, two on each side, but the machine can operate one torch on each side or any number of torches, as long as there is room enough on the arm. All torches will travel over the same course.

Arms are mounted solidly on the carriage and the torches are attached to slides. They are moved positively by rack movement. The carriage to which the arms are attached moves on track on rails and also by means of a rack (Fig. 4) in a positively controlled way. The record drums are geared to these rack movements so that every movement of the torch in a transverse or longitudinal direction is reflected in a movement of the respective record. The distances on the circumference of the record drums therefore correspond to the distances that are traveled by the torch.

Function of the records is to control movement of the drive motors. As the machine moves on, the record drums rotate and the markings controlling "stop and start" of the motors will pass in front of the photoelectric scanners and thus control each individual increment of movement. As every point on the contour corresponds exactly to a point on the record, and as there is a straight gear relationship between the record and the movement, a continuous control prevails, assuring complete accuracy. The record drums contain, so to speak, recordings of the actual movement of the machine with respect to a rectangular co-ordinate system in which one axis is the track of the machine and the other the arms. Travel is independent of the speed which can be set by independent means.

Preparation of Records: These are prepared in a rather simple manner by a reversal of the procedure set forth. A drawing is placed where the steel plate ordinarily would be located and the burning torch is exchanged for a pointer. This is demonstrated in Fig. 5. The operator then guides the torch by manual push button control along contours to be cut. As he does this, a recording is made, as in close up view, Fig. 6, of the actions of the two drive motors which were needed to follow the desired contour.

Actually, this procedure is substantially simplified by recording only a certain number of important reference points on the machine and interpolating, by an auxiliary machine, all the additional points which in total represent the record. Because of the straight gear relationship between the drums and the movement of the machine, it is possible to change that gear relationship and take a recording, for instance, from a half-sized drawing. In fact, it is not even necessary to make the recordings on the machine itself, as they can be made on a so-called recording device independent of the machine and either to the full scale or to any scale desirable within reason.

Recording Device: Basically this is of the same construction as the machine itself, but without drive motors and photoelectric control equipment. The scribing device consists of four individual scribers, each attached to one drum mechanism. A needle scribes a helical track on the record drum, and this needle is actuated in such a way that at each reference point—that is, where a change in movement takes place—a line vertical to the helix is scribed. These short vertical lines are the markings referred to before. The cutting motion of the records is the equivalent of the scribing motion, but in reverse. Setup for scribing four records on the machine itself is shown in Fig. 7.

For practical purposes, a number of additional features are incorporated into the machine. For instance, besides cutting in the direction in which a record was taken, it is possible to reverse directions by a simple control lever. It also is possible, by another set of control levers, to vary the cut in such a way that a mirror image of the original shape can be reproduced. For a variety of purposes, this has been found very helpful in practical operation. The machine is further supplied with stop motions, and, while the general control panel is in the center of the machine between the rails, there are auxiliary control switches on the arms which permit control from this location.

The general method followed in most contouring devices is that of a so-called "follower" system, i.e., that a template or pattern, either metal or wood, is followed around by a roller or feeler. Another method is to follow the contours of a drawing by photoelectric means. In each case, the template or pattern or drawing resembles the shape to be cut. Any change in the template or in the pickup will result in inaccuracies. In the ISC system, however, a shape in the form of a template or pattern or drawing is not followed, but a recording is taken of the movements necessary to produce such shape, and this recording controls the motors and causes them to reproduce the necessary definite movement.

Control system for the flame cutter was developed at first on a theoretical basis by the Industrial Scientific Co. with the intention of avoiding some of the obvious difficulties encountered in contouring and facsimile work. Theory and practice have been combined in extensive experimental work. According to William S. Tandler, president of ISC, the first machine has been in production operation for approximately 3 years. Machines operating in shipyards and fabrication plants have been tested under the most adverse conditions and found satisfactory

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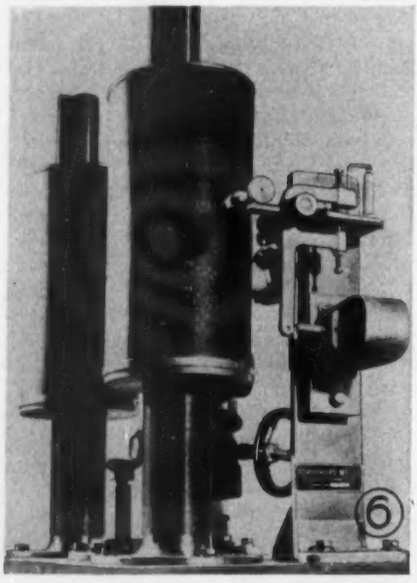

Fig. 6—Closeup of scriber making a record with small white dots or vertical lines

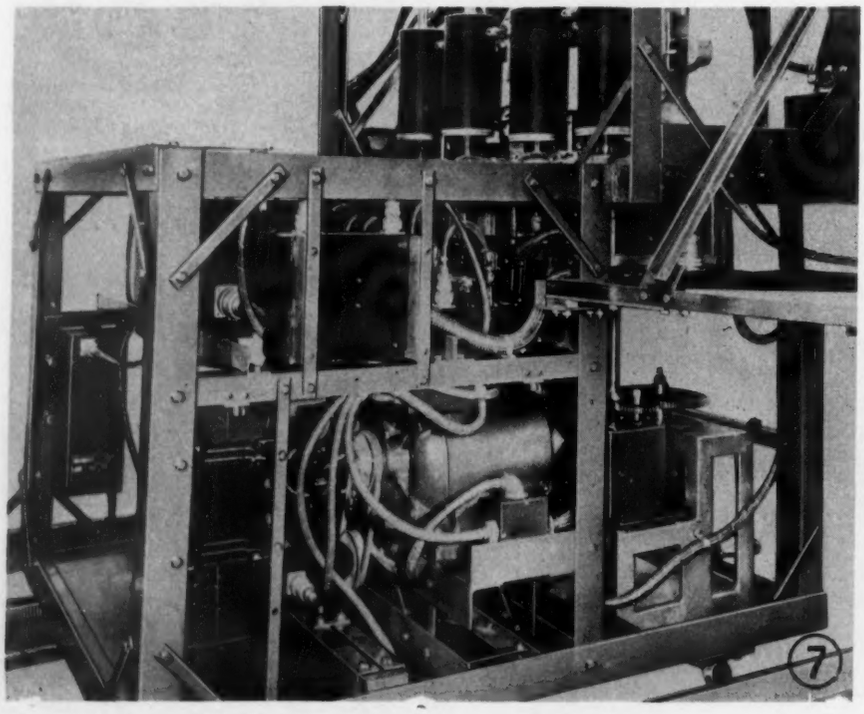

Fig. 7—Machine set up for scribing two pairs of records

By P. M. DICKERSON
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A New Gaging Method for QUALITY CONTROL

Method for detecting trends and distributions in defective production, used in conjunction with go-no-go gages, charts parts progress in relation to tolerances on hourly basis. Rework reduced from 10 to less than 1 per cent

INSPECTION by means of go-no-go gages (the method of attributes) ordinarily has many drawbacks. It does not reveal trends or slow changes in the manufacturing process which, if allowed to continue, might result in the production of scrap. Actual measurement of the manufactured product (variables inspection), of course, reveals such trends and makes it possible to prevent defects.

Use of go-no-go gages also does not enable the manufacturer to find the distribution of the product for the dimension inspected. In other words, if all parts pass the go-no-go gages, the parts measured may be just inside either tolerance limit and further use of the tool would result in defective production. The effect of tool wear displacing the bell-shaped distribution curve toward specification limits is familiar. If the distribution of any single hour's production is just barely within specification, the manufacturer should know of his precarious position.

Normally, only control charts in the form of fraction defective charts can be used with attributes inspection. However, defective charts are quite insensitive. If you deal in thousands of parts, 1 per cent defective is a large number numerically. A purchaser using a fraction defective chart could determine the quality of a large quantity of material already produced. The manufacturer, however, usually does not find it economical to base his controls upon effects already produced. He prefers to detect trends and know distributions in order to prevent the manufacture of defects.

Thus, considering the difficulties mentioned, any means of detecting trends and distributions should be welcome indeed when the manufacturer is forced by circumstance to use attributes gages. The accompanying examples of charts may be used for this purpose. Example A shows a typical instance. Some gages, such as Microcheck gages, indicate size continuously but the only marks or figures on the scale are tolerance limit pointers set according to standard parts. The inspector can, with this type of gage, determine by the position of the moving pointer, with respect to the limit pointers, whether the parts are above the plus limit (plus R), in the upper one-third of the tolerance (L), in the middle one-third of the tolerance (M), in the lower one-third of the tolerance (S), or below the minus limit (minus R). Where the distance between the set tolerance limits is too small to estimate three regions within the tolerance limits, the form showing R, L, S, minus R only is used. In this case, L is the upper half and S the lower half of the tolerance.

If go-no-go ring or plug gages must be used, refer either to the 0.632 plus or minus 0.001-in. section of Example A or to Example B. This method presupposes some previous training of inspectors so they will know, for instance, when a sample part fits tight on a go plug gage or loose enough so that it will almost fit on the no-go plug gage.

Extensive information cannot be obtained from this kind of chart. As men-

(*Please turn to Page* 146)

CONTROL CHARTS BY ATTRIBUTES

NAME OF PART | DWG. NO. | DATE

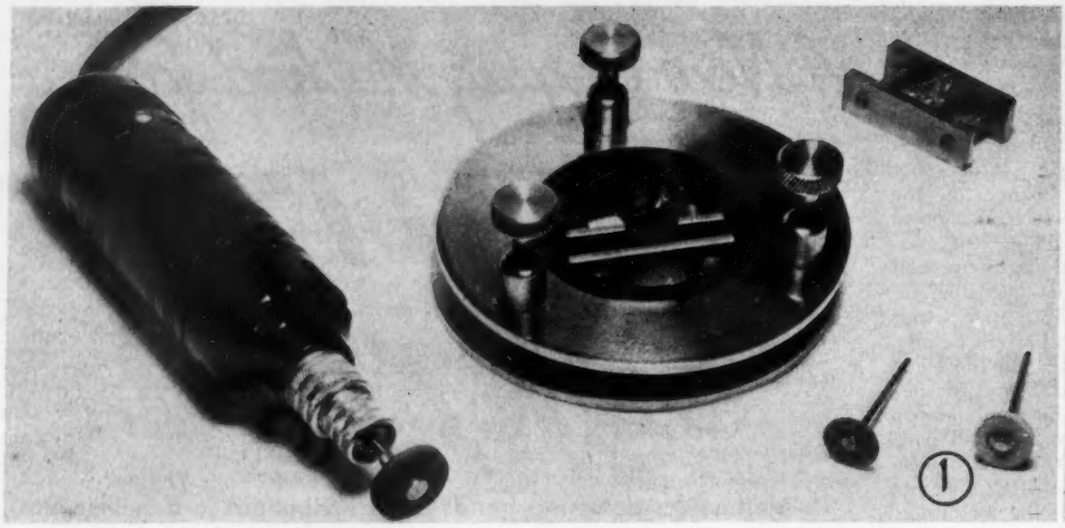
PIECES INSP. | MACH. NO. | INSPECTOR

EXAMPLE A

DIMENSION		8:00AM	9:00AM	10:AM	11:00AM	12:00	1:00PM	2:00PM	3:00PM	4:00PM	5:00PM	6:00PM	7:00PM	8:00PM	9:00PM	10:00PM	11:00PM	12:00 PM
0.250±0.002	+R		XXX	TOOL CHANGED					XX	TOOL CHANGED					XX	TOOL CHANGED		
	L	XX	X				XX	XXX	XX					XXX	XX			
	M	XX				XXXX	XX	X			XXX	XXX	XXXX	X			XX	XXXX
	S			XX	XXX					XXXX	X					XXXX	XX	
	-R			XX														
0.632±0.001	+R																	
	L	XXX	XXX			X							XXX	XXX	XXX	XX		
	S			XXX	XXX	XX	XXX	XXX	XXX	XXX	XXX	X	TOOL CHANGED			X	XXX	XXX
	-R											XX						

EXAMPLE B

SAMPLE NO. (RECORD TIME)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DIMENSION	R L S	R L S	R L S	R L S	R L S	R L S	R L S	R L S	R L S	R L S	R L S	R L S	R L S	R L S	R L S	R L S
0.250 ± 0.002	XXX	XXX	XXX		X XX		XXX	X XX	XXX	XXX	XXX	XXX	XXX X	X XX X	X XX	XXX
0.632 ± 0.001																



A New Tool for Metallurgical Research

FRACTOG-A

The microscope at high magnification combines with an effective method of studying crystal facets as a means for delving into brittle fractures of metals caused by fatigue, corrosion, etc. Resultant "fractographs", first demonstrated to members of ASM, reveal structures that are not observable in conventional polished and etched specimens

By CARL A. ZAPFFE and MASON CLOGG, JR.

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Rustless Iron & Steel Corp.
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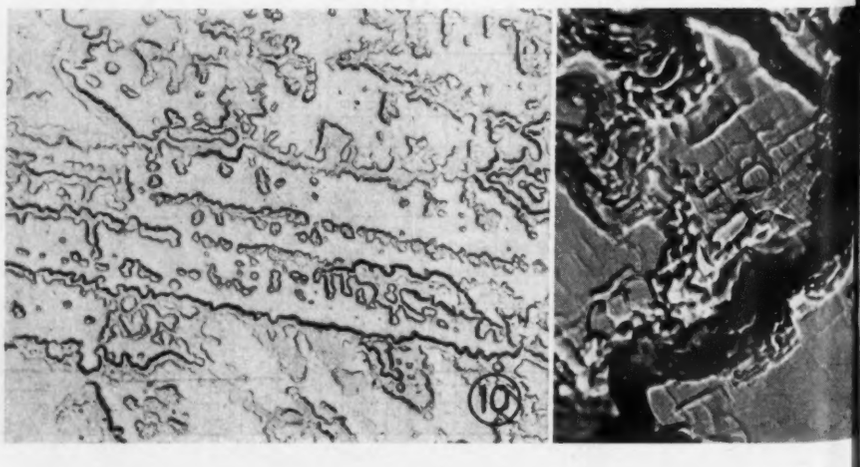
Baltimore

FRACTURE of a metal often holds much information for the metallurgist. Brittle fractures, fibrous structures, and fractures caused by fatigue, corrosion, segregation and lamination—each has its characteristics and story to tell; but, to date, only the macroscopic features of fractures are known.

As an example of the information or misinformation contained in the appearance of fractures, we may recall the work of Ewing and Humfrey[1] which exploded a metallurgical myth current years ago by showing that the "coarsely crystalline" appearance of certain fatigue fractures was not a matter of grain coarsening, but of fracture type.

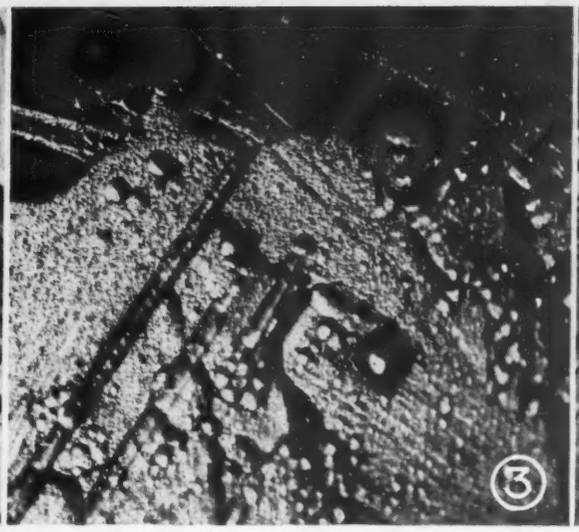
At the turn of the present century, there was provided a real basis for believing that valuable metallographic information might lie within a fracture[2-7]. Stretching a polished specimen while

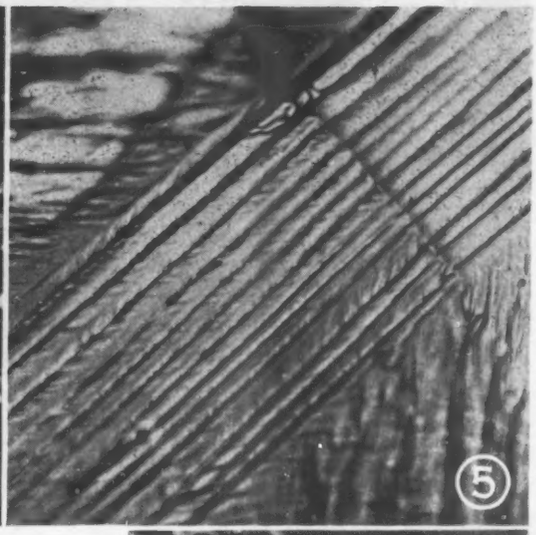


IDENTIFICATION OF PLANES

The system of notation for faces of a crystal and for planes within a crystal or space lattice—which includes such indicators as [100], [110], etc., for planes or sets of planes—is used universally to specify orientation. Indices, often called "Miller Indices," are based on the intercepts of a plane with the three crystal axes (three edges of a unit cell, as represented in Fig. 4). Intercepts are measured in terms of the dimensions of the unit cell, or *unit distances along the three axes*. For example:

A plane that cuts the X axis at r distance from the origin (designated by O in diagram, Fig. 4) equal to half the "a" dimension of the cell may be said to have an X intercept of one-half that distance; if it cuts the Y axis at ⅓ b, its Y intercept is ⅓. This rule still applies when the "a" and "b" distances on X and Y axes are of different lengths than shown; also one distance could be greater or less than the other. To find the indices of a plane as in Fig. 2: (1) Find the intercepts on the three axes *in multiples or fractions of the unit distances on each axis;* (2) take the reciprocals of these numbers; (3) reduce to the three smallest integers having the same ratio; and (4) enclose in parentheses or brackets, as [100], [110], etc. Hence, the plane shown cutting the axes in Fig. 2 has intercepts 1,1,1. For simplicity and convenience this series is bracketed and shown as [111]. Parentheses used around Miller indices mean a single plane or set of parallel planes. Here brackets signify planes of a "form"—those which are equivalent in the crystal. In the three-dimensional or cubic lattice (represented by sketch at right, Fig. 4), the larger the indices of a plane, the shorter the distance between these planes; the smaller the indices of a plane, the closer the approach of the atoms and the greater the atomic population on the planes[8].—The Editors.





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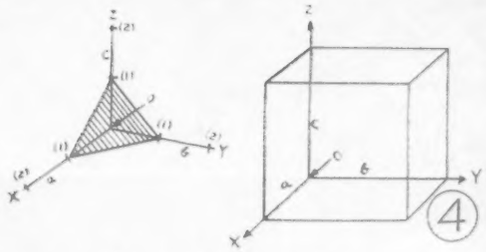
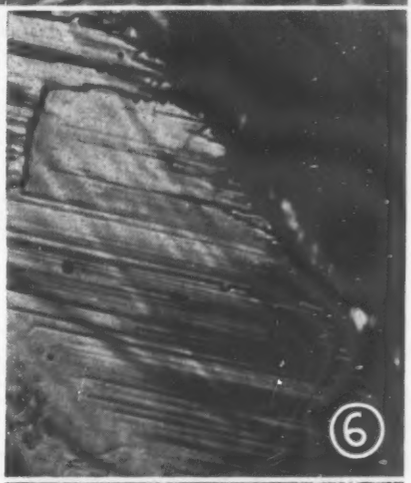




examining it under a microscope, Ewing and Rosenhain disproved another myth of that period by demonstrating that metal remains crystalline after plastic deformation. As shown years before with minerals, undisturbed blocks of the crystal become bounded by crystallographic deformation lines which develop when the specimen is strained beyond its yield point. These we know as "slip lines."

Furthermore, by copper-plating fractures to preserve their characteristics, these same investigators examined polished cross sections and showed that even the most "fibrous" fracture of steel usually develops along flat, crystallographic cleavage planes, the only distinction between a fibrous and a crystalline fracture being in the extent of the individual cleavage.

In recent research with embrittled metals, one of the authors of this article became interested in the intrinsic differ-

Fig. 1—*Appliances that are used in fractography*

Fig. 2—*Cleavage facet of cast* 1.59 *per cent silicon ferrite, unetched*

Fig. 3—*The same facet as in Fig.* 2, *heavily etched.* X500

Fig. 4—*System of notation for crystal faces and for planes within crystal or space lattice. Cubic lattice with identical axes at right*

Fig. 5—*Fracture, cathodized Armco ingot iron.* X750

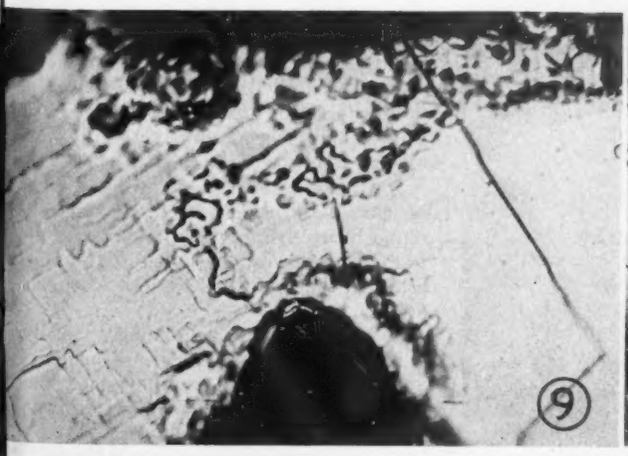
Fig. 6—*Fracture, rock salt.* X200

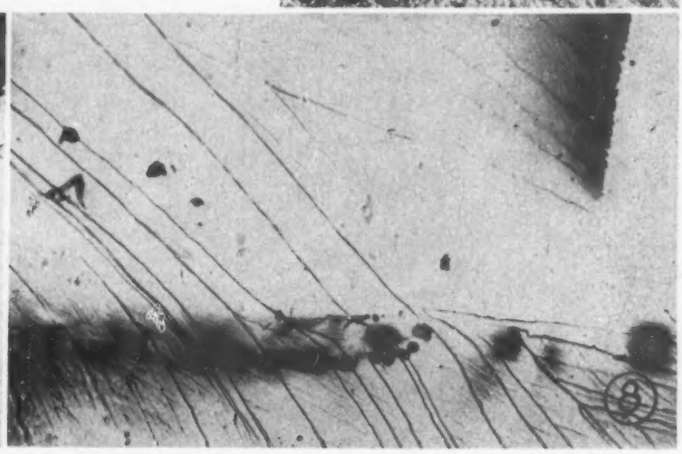
Fig. 7—*Fracture, as-cast* 4.24 *per cent silicon ferrite.* X100

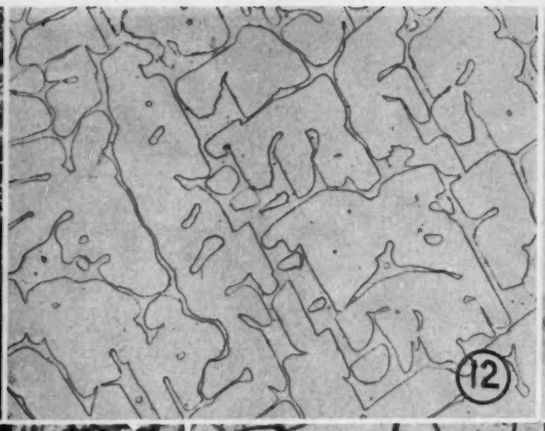
Fig. 8—*Fracture, rock salt.* X200

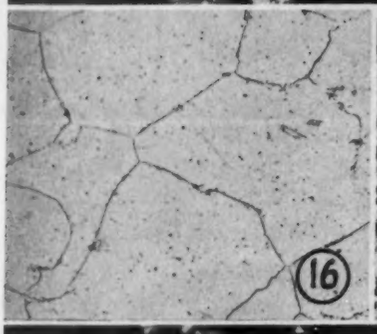
Fig. 9—*Fractograph of* 75 *per cent ferrosilicon with pattern characteristic of* Fe_2Si_5 X500

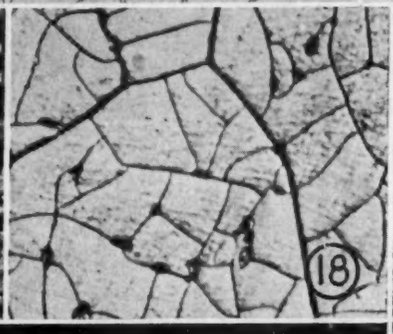
Fig. 10—*Phase determination. Ordinary polished specimen of* 18.10 *per cent ferrosilicon etched with* 25 *per cent* HNO_3. X100

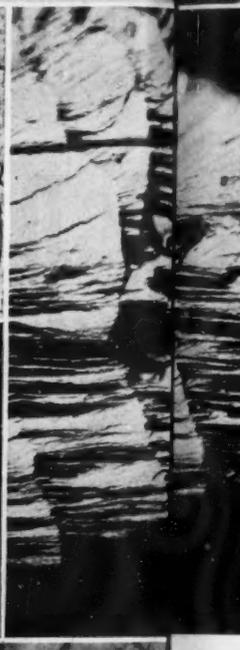


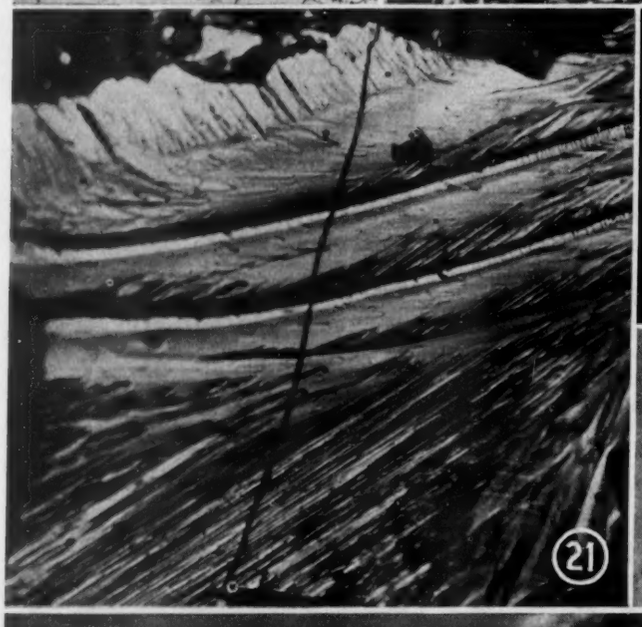


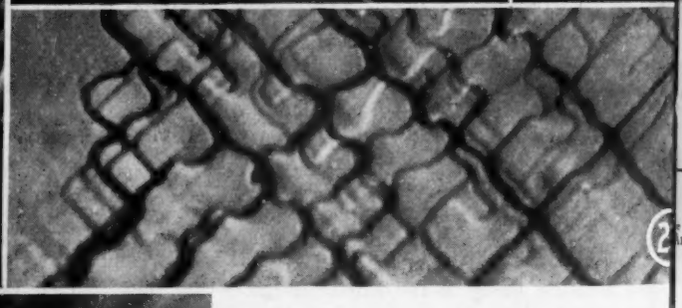


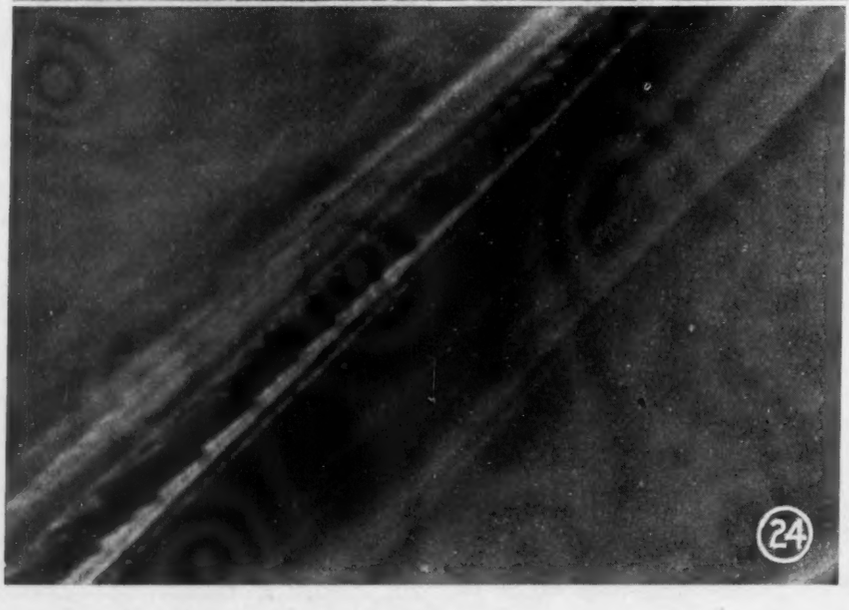












ences that might exist between the facets which extend widely during brittle fracture, giving a mirror-like reflectivity, and those which become pulverized during deformation to provide a gray, fibrous appearance from the myriad of tiny unresolved reflections. Once the discouragement afforded by irregularities and promontories on the fractured faces was surmounted, some surprising and satisfactory results were obtained.

As possible advantages which might be gained by using a method and technique for studying with a microscope the individual facets on fractures, points listed in the following paragraphs are of interest.

1. When cleaving crystallographically, the specimen naturally has many of the attributes of a single crystal which can be oriented with the microscope,

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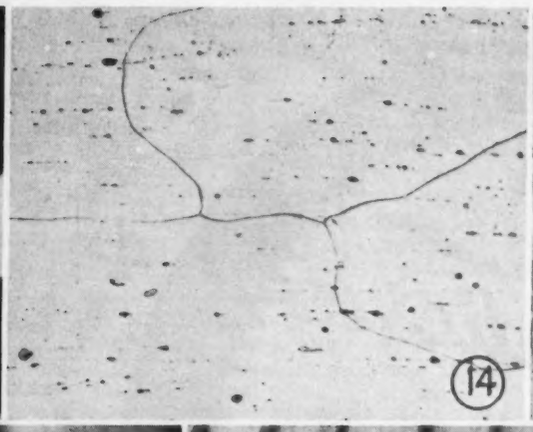
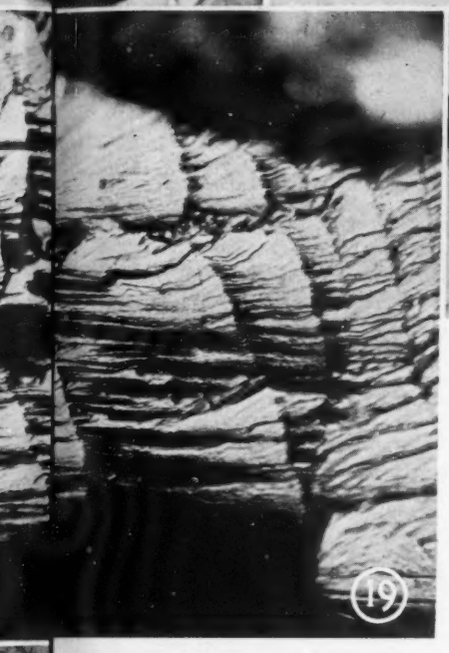




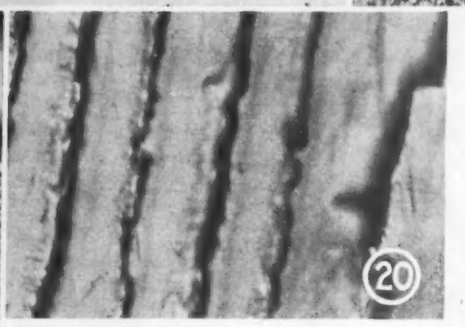


Fig. 11—Heat-etched fracture of specimen in Fig. 10. X500

Fig. 12—Phase determination. Ordinary polished specimen of 28.83 per cent ferrosilicon etched with 25 per cent HNO_3. X100

Fig. 13—Fracture of specimen in Fig. 12 etched with 20 per cent HNO_3—20 per cent HF solution. Magnification X1000

Fig. 14—Large-grained and decarburized surface layer of Type 405 stainless steel air-cooled from hot rolling at 2000 degrees Fahr. Polished specimen etched in HCL-picric acid. X100

Fig. 15—Fractograph of specimen in Fig. 14 at X750

Fig. 16—Type 446 stainless steel annealed 40 hours at 1600 degrees F. and water-quenched. Polished specimen etched with mixed acids in glycerol. X100

Fig. 17—Fractograph of specimen in Fig. 16 at X750

Fig. 18—Polished specimen of 11.84 per cent ferrosilicon etched in 25 per cent HNO_3. X100

Fig. 19—Fractograph of 11.84 per cent ferrosilicon at X500

Fig. 20—Fractograph of specimen in Fig. 19 at X2000

Fig. 21—Fractograph of 11.84 per cent ferrosilicon at X200

Fig. 22—Fractograph of specimen in Fig. 21 at X2000

Fig. 23—Fractograph of commercial 50 per cent ferrosilicon showing in detail the characteristic cleavage pattern of the Fe_2Si_5 phase. Magnification X2000

Fig. 24—Fractograph of 18.10 per cent ferrosilicon showing unusual structure within one of the grains. Magnification X4200

SPECIMEN	COMPOSITION %	CONDITION
Armco Ingot Iron	C— 0.013 Mn— 0.019 Si— 0.001 P— 0.003 S— 0.018 O— 0.03 N— 0.005 Cu— 0.041 Ni— 0.02 Sn— 0.008 As— 0.012 Others— 0.01	Commercial grade, hot-rolled. Specimen ¼-inch square cleaned by rough polishing, cathodized 60 minutes 10 per cent NaOH, 20 degrees Cent., 3 amps./in. Niched with a saw and fractured by hammerblow.
Type 405 Stainless Steel (Modified)	Cr—14.29 C— 0.047 Al— 0.23 Mn— 0.52 Si— 0.38 Ni— 0.23 S— 0.016 P— 0.020	Air-cooled after hot rolling to 2¼ inches x ⅞-inch.
Type 446 Stainless Steel	Cr—26.10 C— 0.104 Mn— 0.45 Si— 0.63 Ni— 0.13 S— 0.010 P— 0.010	Annealed 40 hours at 1600 degrees Fahr. and water-quenched.
Silicon Ferrite	Si— 1.59 C— 0.034	Melted in induction furnace from Armco ingot iron and ferrosilicon (50 per cent). Cast in 5-lb. cast-iron molds. Fractured by hammerblow in as-cast condition.
Silicon Ferrite	Si— 4.24 C— 0.038	Same as above.
Silicon Ferrite	Si— 4.96 C— 0.042	Specimen from Allegheny Steel Co., Dr. C. S. Barrett. Commercial heat, 12 by 12 by 36-inch ingot cooled slowly under hot slag. As-cast crystals fractured by hammerblow.
Silicon Ferrite	Si—11.84 C— 0.038	Same treatment as 2 per cent.
Silicon Ferrite	Si—18.10 C— 0.052	Same as above.
Silicon Ferrite	Si—28.83 C— 0.040	Same as above.
Silicon Ferrite	Si—50.18 C— 0.122 P— 0.045	Commercial 50 per cent ferrosilicon as-cast. Fractured by hammerblow.
Silicon Ferrite	Si—78.26 C— 0.045 P— 0.021	Commercial 75 per cent ferrosilicon as-cast. Fractured by hammerblow.
Antimony	Sb—99.811 Pb— 0.035 As— 0.035 S— 0.04 Fe— 0.015 Cu— 0.01	Commercial antimony as-cast. Fractured by hammerblow.
Bismuth	Bi—99.8 Ag— 0.01 Pb— 0.005 Fe— 0.01 Cu— 0.005 S— 0.01	Commercial bismuth as-cast. Fractured by hammerblow.
Rock Salt	NaCl—98.51 Ca_2SO_4— 1.02 Moisture— 0.04	Commercial grade. Fractured by hammerblow.

Automatic Broaching Setup

By G. W. BIRDSALL
Associate Editor, STEEL

. . . . cuts involute internal teeth to full depth on stack of clutch disks. After loading in fixture, machine automatically moves fixture to cutting position, indexes to make series of nine cuts, and returns for unloading

Fig. 1—The 90 teeth around inside diameter of a 1½-inch thick stack of these disks are broached in nine cuts, 10 teeth at a time

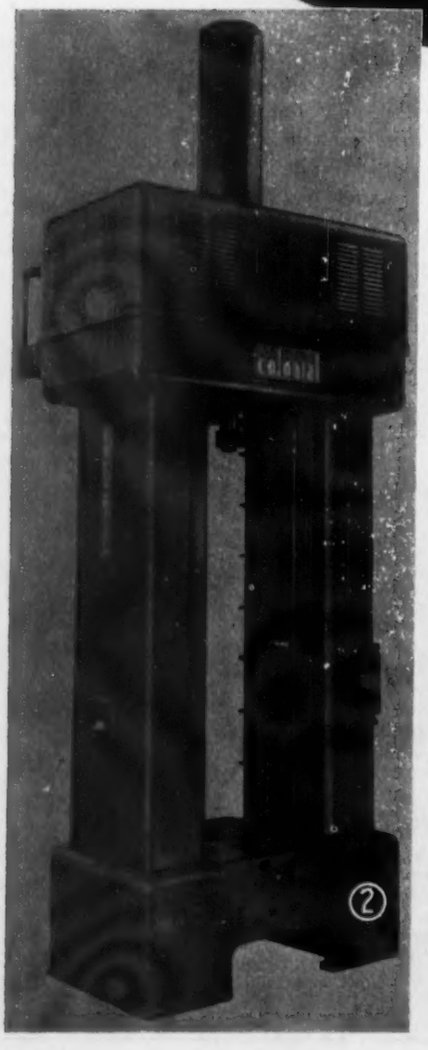


Fig. 2—The 15-ton capacity Colonial hydraulic press used on the automatic broaching job described here

WHERE a sufficient volume of production is available, automatic broaching setups with relatively low cost broaches can often be designed that will afford amazing versatility and savings in production costs, while meeting the most exacting requirements.

Perhaps typical of what can be done is the arrangement shown here for automatically broaching involute internal teeth on heavy duty clutch disks. While total volume for each disk size is not great, six different sizes of disks can be handled on this same machine using the same fixtures simply by changing adapter rings in the fixture. This broaching setup is also used to cut internal teeth in cast iron clutch elements, Fig. 5. The installation was designed and engineered by Colonial Broach Co., Detroit.

The clutch disks, Fig. 1, are of mild steel, 14 in. inside diameter. They are used in agricultural equipment such as farm tractors. Thirteen disks are stacked and worked simultaneously, the stack being about 1½ in. in height as each disk is approximately 0.115-in. thick.

Tooling: The 90 teeth around the inside diameter are cut 10 at a time. The full tooth depth is produced in a single stroke of the broach ram as the broach is designed with sections which rough, semi-finish and finish the tooth contours at one stroke. Length of stroke is 72 in. The broach itself is made in short sections, the total broach length of 66 inches being divided into six sections. These are made and fitted so accurately that the individual sections can be replaced as needed.

Broach sections are all 4 in. wide. They are attached to the broach bar or ram by a tongue which fits into a groove in the bar. They are locked in place from the back side with screws. The bar is 5 in. wide, 3 in. thick. Although this massive bar is quite strong, assuring minimum deflection, close fitting guides are provided for the bar both above and below the work. The broach bar enters guides below the work before the cut begins, thus assuring maximum tool support, preventing "chatter," and the like. Bar and massive guide framework can be seen in Figs. 3, 4 and 6. Part of the broach and groove into which its tongue fits can be seen in Figs. 3 and 4.

"Push" Type Machine: The teeth are cut by pushing the bar carrying the broaches down past the work. Fig. 2 shows the skeleton power press employed as it appeared before addition of tools, fixtures and hydraulic controls. This unit is rated at 15 tons capacity and has the motor, hydraulic pump and other principal components mounted above the framework of the machine. When installed, the machine was mounted so the work fixtures come at a convenient height for loading and unloading. While the machine base rests on floor level, the bar and insert assembly extend into a pit below floor level, due to the long stroke.

Work Fixture: The rings are stacked in the sliding fixture shown in Figs. 3 and 4 when the fixture is in the extended position, Fig. 3. Four dogs are turned over the work and clamped down by hand to hold the work securely in the fixture.

Controls: Now the automatic work cycle is started by pushing the "start" button, the second from the top in the control group at the right, Fig. 3. The top button at the right and the button on the left column are both "stop" buttons. Third from the top at the right is a selector switch for automatic or hand operation. Fourth, fifth, sixth and seventh buttons are "inching" controls, one each for moving "fixture in", "fixture out", "ram down" and "ram up". These inching buttons are used only in making and checking the setup, of course, and are operative only when the selector switch is in the "hand" position.

Automatic Cycle: Once the operator has loaded the fixture and pushed the "start" button, the machine automatically moves the fixture to the working position and controls movement of fixture, work and ram to make a series of cuts. Then it returns the fixture to the unloading position and stops.

The details of these operations are of interest because it is necessary to advance the work to the cutting position and hold it there while the broach is descending, cutting the teeth. Then the work must be moved away from the broach while the broach retracts or rises to its original position.

Then, too, after each cut the work must be indexed accurately for the next cut. This sequence then becomes as follows:

—Operator places work in fixture and tightens clamps.

—Operator pushes "start" button.

—Automatic cycle controls take over further operation and

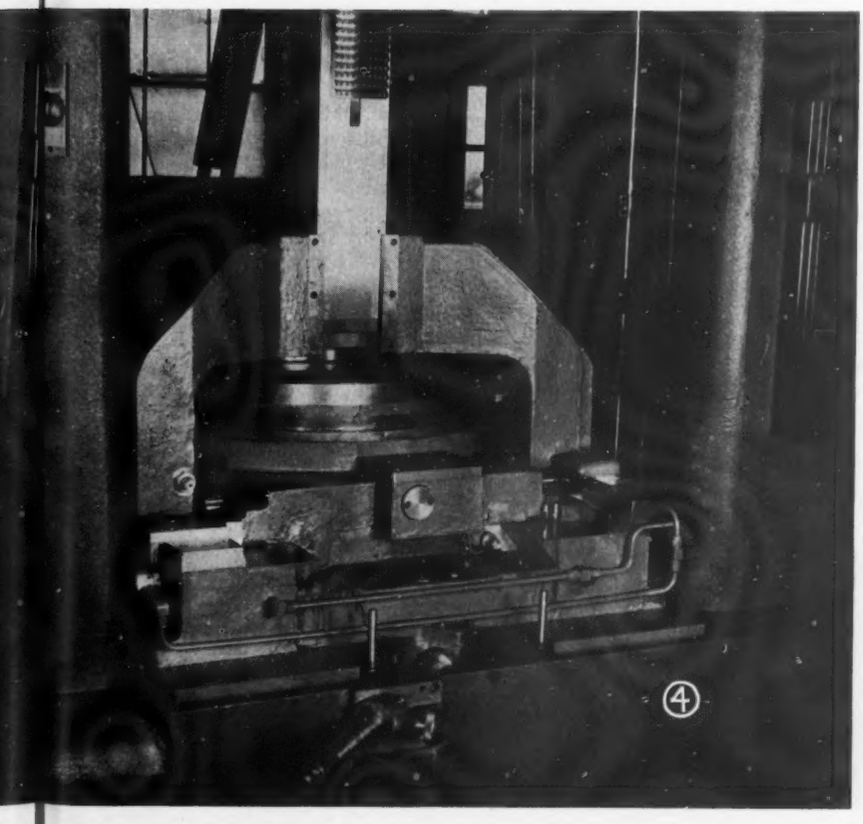
—move fixture into working position;

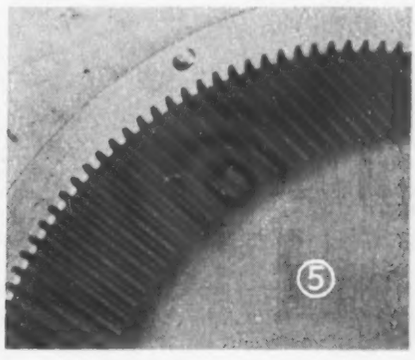
—move ram carrying broach down past work, cutting first 10 teeth;

Fig. 3—Closeup of shuttle-type fixture in the loading position. Colonial Broach Co., Detroit, supplied photos, designed the installation

Fig. 4—Same view as Fig. 3 but here fixture has moved in under the broach. Note control pushbuttons at right and left. Crank in lower foreground operates ejection pins in base of fixture

Fig. 5—The same automatic broaching setup is also used to cut internal teeth on cast iron clutch elements like this one





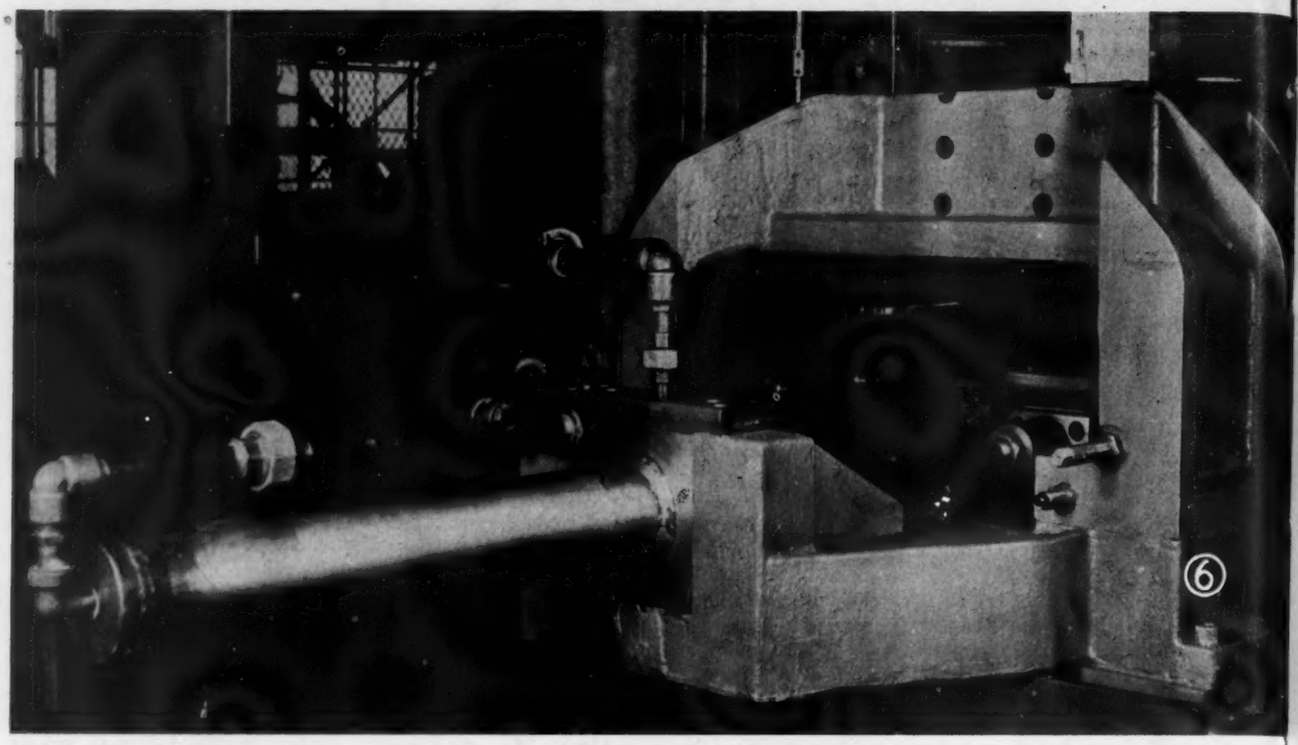


Fig. 6—View from rear of fixture showing hydraulic cylinder operating shuttle type fixture. Note massive construction of frame and broach guides. Broach bar enters guides below work before cut begins

—move fixture so work clears broach.
—Broach moves up to original position.
—Fixture moves further back, and
—indexing for next group of 10 teeth takes place as
—fixture moves up to cutting position.
—Ram descends, broach cuts next set of teeth.

Cycle continues until 90 teeth have been cut at nine cutting positions.

—Upon completion of last cut, fixture moves forward for unloading and machine stops.

The automatic controls include a cycle controller as well as microswitches which determine stop points of the various motions involved in moving the fixture to its four different positions, the ram to its two positions and the indexing plate to its nine positions. These microswitches in turn operate electric valves in the hydraulic lines to the hydraulic cylinders which produce the motions. These switches are so accurate that they afford the necessary precision without the use of mechanical stops or other devices.

The hydraulic cylinder producing the motions of the fixture on its slides can be seen at the left in Fig. 6. Two microswitch actuating buttons can also be seen here on the far side of the frame in the path of the fixture. The indexing plate is actuated by shuttle motion of fixture. The fixture is locked in position to receive thrust of broaching cut by two hydraulically actuated wedges as indicated by connecting lines in Fig. 4.

Good Production: The entire working cycle is quite fast, yet the operations are always under precise control. The significance of this automatic broaching setup is the great increase in production and reduction in costs that it has made possible. When using internal shaping tools to cut these teeth, a production time of 45 min. to an hour per disk load was required.

Now, however, 10 to 12 sets of disks are produced per hour. Since each set contains 13 disks, this is an output of 130-156 per hr from this one machine. At 12 sets per hr, this is a production time of 5 min per set, which includes unloading and reloading time as well as that required for the machine to go through its automatic cycle. Since nine strokes of the broach are required fo each set of disks, this means that eac stroke including indexing for next stro takes place in something under ½-mi

Following through the entire auto matic cycle, different successive move ments add up to a total of 56, divided a follows: After the fixture has been move in position, six movements are involve in making each stroke as ram move down (1), fixture moves back to clea broach (2), ram moves up (3), fixtur moves further back to clear for indexin (4), fixture indexes for next 10 teeth (5 fixture moves up to cutting position un der broach (6). Since nine strokes ar necessary for the 90 teeth, this involv a total of 54 movements. Adding tw more for movement of the fixture to an from the loading position gives the tot of 56.

The crank handle seen in the extrem lower foreground of Figs. 3 and 4 op erates ejection pins which push the stac of disks up out of the fixture for un loading.

Bulletin Describes Luminous Flame Burner

A luminous flame burner with uniform air distribution for steel mill reheating furnace operations is described in bulletin No. 1001, available from Bloom Engineering Co., Pittsburgh. It includes engineering data developed from practical steel plant tests. A curve is presented giving radiating power of luminous flames at various flame and steel surface temperatures. A feature of the burner is its availability as a combination burner for either gas or oil, with provisions for switching from one to the other with no loss of production. Air supply is the same for either fuel. Some applications of the burner are in slow-cooling pits, annealing furnaces, heat treating operations, large and small forging furnaces, and car-type annealing furnaces.

As air enters body of burner, it passes between radial vanes, and its flow is straightened to uniformly surround gas nozzle. This principle governs burner port size and capacity. Flame retention is achieved by a small bell flange nozzle ti producing turbulence in contacting laye of both air and gas at merging poin with a burnable mixture retained in po block.

—o—

An illustrated catalog describing a li of airblast equipment, including room cabinets, tanks, suction guns, nozzle and accessories, is available from Am ican Foundry Equipment Co., 555 Sou Byrkit, Mishawaka, Ind., or its sales re resentatives.

Which OF THESE TWO TOOLS Will Stay On The Job Longer and Reduce Production Costs?

With this Hampden die, time between polishing stretched from 5 to 42 days. The tool room saved 66 hours of polishing time each month, and had 132 fewer tools to make per month.

This extrusion die worked for 5 days before abrasion caused galling. Every time dies galled a half-hour was lost changing 30 dies in the press, and another half-hour was needed to repolish each die.

How Can a Tool Engineer Get *Protection* Against the Loss From Tools That Do a Half-Way Job?

The surest way is to use the Matched Set Method of selecting the proper tool steel for each job. For this method does more than simplify tool steel selection. It also points the way to better heat treating results, and better performance.

The extrusion die shown here is a good example. It is typical of the hundreds of tooling jobs on which tool engineers and tool makers are getting more output at less cost—the Matched Set Way. By using the Carpenter *Matched Tool Steel Manual* as a guide, they can actually plot tool performance before tools are made. And the 80-page Tool Index and Steel Selector in the Manual quickly points to the best starting place when a new problem hits the tool room.

A note on your company letterhead will start the Matched Tool Steel Manual on its way—free in the U. S. A. So drop us a line and find out how the Matched Set Method can be put to work in your plant. You'll save time, tool steel and money.

THE CARPENTER STEEL COMPANY
139 W. Bern Street, Reading, Pa.

Carpenter MATCHED TOOL STEELS

METAL POWDERS

. . . . produced by fused salt electrolysis for powder-metal compacts. About 20 different metals have been deposited as small crystals or dendrites by this method

FAR-SPREAD interest in powder metallurgy has suggested the production of relatively pure metal powders or metal-alloy powders by the fused salt electrolyte method. The three major products of the fused electrolyte industry at present are sodium, aluminum and magnesium. In each case the temperature of the fused salt bath is decidedly above the melting point of the metal produced. Accordingly all three metals are removed from the cells in liquid form.

But when the melting point of the metal is above the bath temperature, the metal will be deposited as small crystals or dendrites. About 20 metals have, according to the literature, been deposited in this form. The advantage of operating the bath at low temperatures and getting a solid rather than a liquid product is offset somewhat by the difficulty of eliminating the entrained or adherent fused salt from the metal crystals. However, a number of methods exist for removing these undesired elements.

Among the metals that have been deposited as solid dendrites are: Thorium, uranium, tantalum, columbium, copper, silver, nickel, iron, chromium, cobalt, manganese, platinum and platinum group metals, beryllium, zirconium, aluminum, tungsten, and molybdenum. Aluminum is a good illustration of a metal that can be deposited easily either as a liquid (fluoride bath) or a solid (chloride bath).

What special advantages do the solid dendritic deposits offer? The first is that of relatively low temperature operation. Aluminum dendrites, for instance, can be produced at 160 degrees Cent. from a NaCl/Al Cl_3 bath with high current efficiency and at half the voltage required in the fluoride bath.

Second advantage of low temperature baths is that the metal can be obtained as a fine crystalline powder of a grain size suitable for direct use in powder metallurgy without preliminary grinding or crushing. An acceptable nickel crystal powder can be obtained from a fused electrolyte of $NiCl_2$ in NaCl.

The third advantage comprises using a solid soluble anode of the crude metal as anode; electro-refining takes place aside from the comminution of the metal. Thus, for example, when electrolyzing fused $FeCl_2$ in NaCl with soluble iron anodes, relatively pure iron crystals will be obtained.

Crystals can be produced that have the advantage of being extremely pure. In addition, they are sharp edged, soft, dense and therefore easy to briquette. When produced by electrolysis with soluble anode of iron, the nucleus or core of the particles is metallic in contrast with that of particles of hydrogen-reduced iron oxide, which may have an oxidic core.

Conclusions of Report

The above information was presented to the Electrochemical Society in a report by W. J. Kroll, consulting electrometallurgist, Niagara Falls, N. Y. Space here permits only Mr. Kroll's conclusions which he briefs as follows:

If fused salt electrolyses are carried out at a temperature above the melting point of the electrolyte but below that of the metal to be deposited at the cathode, we obtain, at high cathode current densities, a deposit of metal dendrites, interspersed with electrolyte. The advantages of this type of electrolysis are lower operating temperature and the resulting reduced power consumption, the winning of metals far below their melting point; and operating at relatively high current densities since the fine crystals covering the face of the cathode present a relatively large actual surface.

Refining can be accomplished by using soluble anodes. The disadvantages are the difficulties encountered in removing the deposits from the cell, the elimination of the entrapped electrolyte, and the combined reaction of air and moisture with the bath.

Actual cell operation was studied. Smooth cathode deposits (sometimes in layers) have been obtained by earlier investigators at very low densities (below 4 amperes per square decimeter). At higher densities, the crystals are oriented and grow into dendrites. The metals with a higher electrode-position voltage tend to accumulate as salts in the bath. Upon increasing the current density, the metal constituents of these salts may also deposit at the cathode.

This is due to the fact that the rate of deposition by the current may be faster than the rate of dissolution from the cathode by chemical equilibrium reactions. Upon interrupting the current, the chemical equilibrium reaction may proceed. This takes time, since alloys have formed on the cathode and solid metal diffusion retards the attainment of equilibrium. Intermetallic compound formation and depletion of certain ions next the cathode will also favor the codeposition of metals having a higher decomposition voltage. Eventually even the metals of the solvent or carrier salt, such as K and Na, will be codeposited.

The refining action at the anode is unpredictable since it depends on the decomposition voltage; as well as the volatility of the compounds formed at the anode (such as $SiCl_4$); on the dissolution or stability of such compounds; on the rate of mixing of the bath; on the formation of intermetallic compounds at the cathode; and on the relative masses of metals and salts involved in the chemical equilibrium over the electrolytic depobath and cathode. At low current densities the refining process may be better, due to the predominance of the chemical equilibrium over the electrolytic deposition equilibrum. The codeposited metal has time to react back with the bath at low current densities.

In the typical case of refining iron by anodic dissolution in an alkali chloride bath, carbon, sulphur, silicon, and phosphorus are eliminated. The iron product obtained is very pure, soft, and free of nitrogen and hydrogen. It is dense, sharp-edged, free-running, and of grain size, suitable particularly for powder metallurgy.

In the electrolysis of a trivalent iron ($FeCl_3$) bath with insoluble carbon anodes, the current efficiency is low due to back reactions of iron trichloride with the deposited iron sponge, forming iron dichloride, and due to the reformation of iron trichcloride at the anode by part of the free chlorine. The electrolysis with an alloy anode was described, using for illustration a ferromanganese anode in a manganese chloride-containing alkali chloride bath. Iron and manganese were deposited and it was shown that chemical equilibrium conditions are not reached since the deposit has no time to react back with the electrolyte.

A Fifth Star has been added...

DEPARTMENT OF THE NAVY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON

5 April 1945

Mr. Lorenz Iversen, President
Mesta Machine Company
P. O. Box 1466
Pittsburgh, Pennsylvania

Dear Mr. Iversen:

It is with heartiest congratulations that the Army and Navy inform the men and women of the Mesta Machine Company that a fifth renewal of the Army-Navy "E" Award was granted your plant at the last meeting of the Navy Board for Production Awards. A new flag with five stars should reach your plant within a few days.

This award, signified by the five stars to be displayed on your "E" flag, is an indication that all of you have maintained the excellent record of production which merited your previous awards. Each and every one of you may well be proud of this high honor and inspiring record.

The courageous men on the fighting fronts must have the necessary weapons with which to wage total war. These men appreciate the vital support of the men and women of the Mesta Machine Company who have worked with such untiring effort on the production front to supply these needed war materials.

Sincerely yours,

C. C. BLOCH
Admiral, USN (Ret.)
Chairman, Navy Board for Production Awards

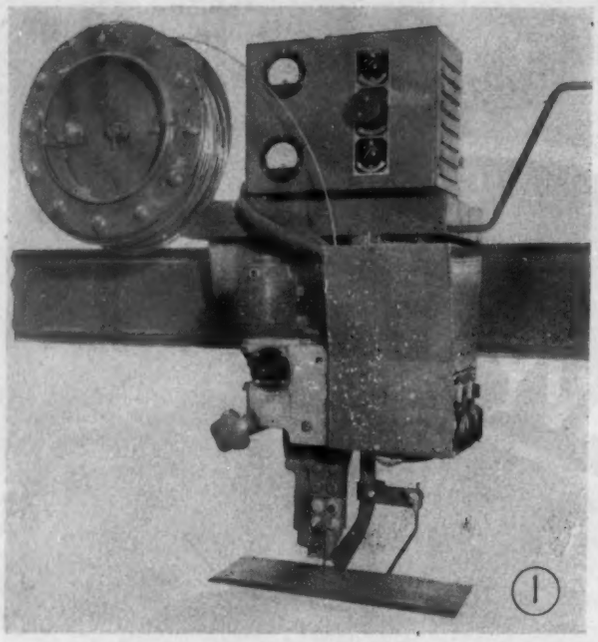
"for the Excellent record of War Material Production"

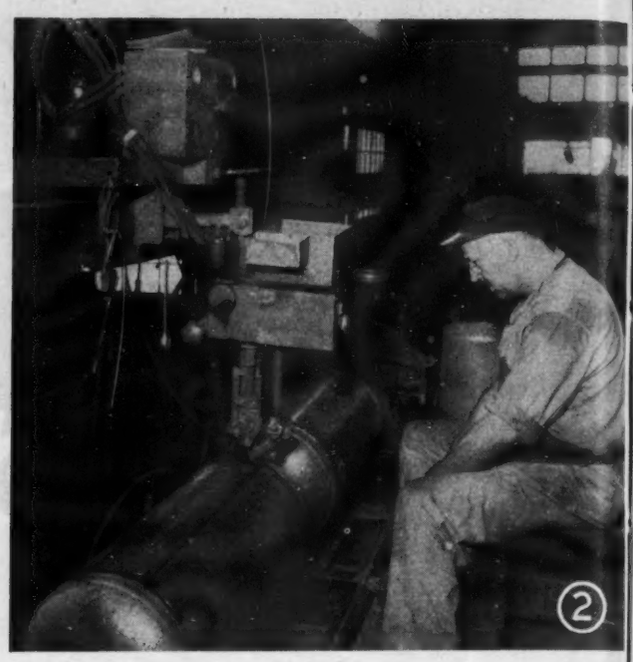
On September 11, 1941 Mesta Machine Company received one of the first "E" awards presented by the Navy Bureau of Ordnance. They later received the all-Navy "E" Burgee and subsequently the Army-Navy "E", to which has now been added the fifth star. Each of the five stars signifies recognition of a continuation of outstanding war production which merited the initial honor.

Rolls · Steel Mill Equipment
Heavy Duty Machine Tools
Forgings

"ALL OUT FOR THE MIGHTY 7TH WAR LOAN"

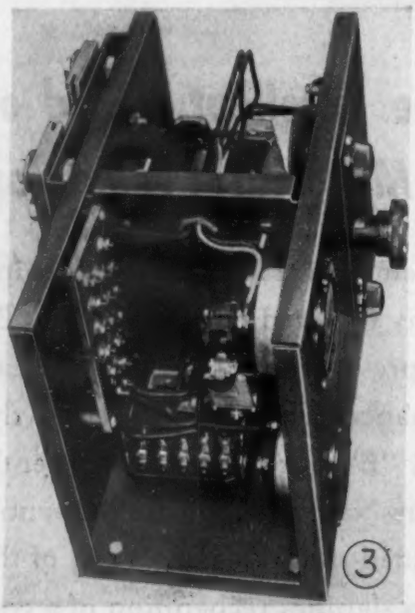
MESTA MACHINE CO., PITTSBURGH, PA.





AUTOMATIC ARC WELDING

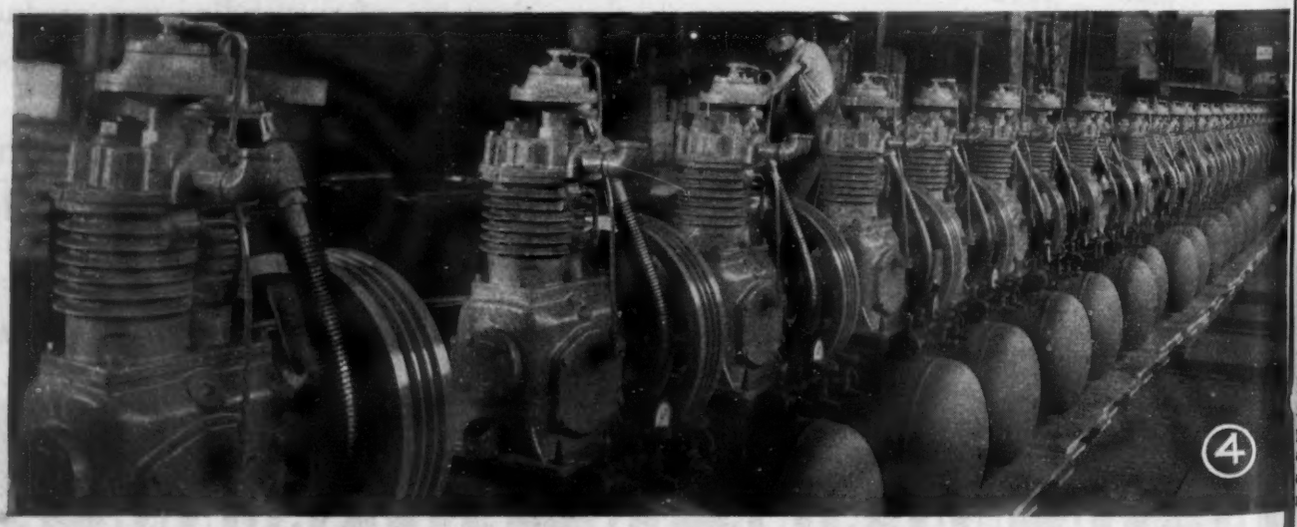
Air Compressor Tanks



Speeds up to 36 inches per minute and 100 per cent penetration with no edge preparation are obtained by Curtis Mfg. Co. with new high-speed unit. Carriage-mounted automatic head on beam is rapidly positioned over seam; special fixture, powered by exciter of welding generator, automatically rotates assemblies to be welded

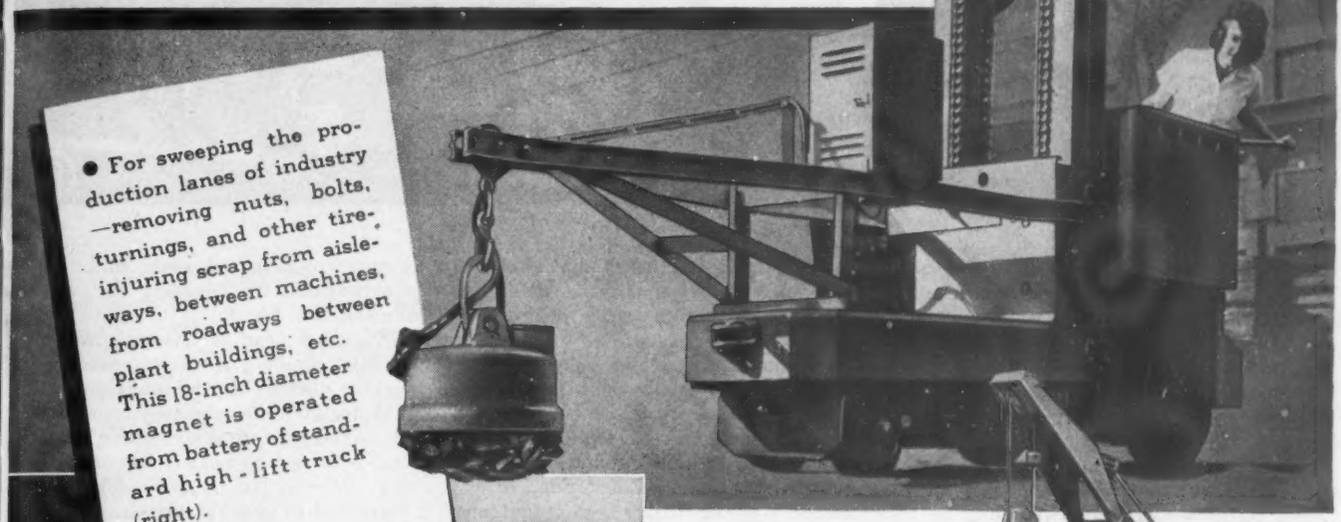
HIGH-SPEED production of air tanks for compressor units by equipment of the latest design for automatic arc welding is reported by Curtis Mfg. Co. of St. Louis to have resulted in a simpler, more economical and foolproof method for construction and one requiring minimum time for materials handling. Air compressor tanks are constructed by a new type of automatic welding known as "Lincolnweld," a process developed by Lincoln Electric Co., Cleveland.

The pressure vessels are made in various diameters and lengths of flange-quality steel ranging in thickness from ⅛ to ⅜-inch. Plates for the shells are square sheared and rolled and the seams are tack welded together. Shells are

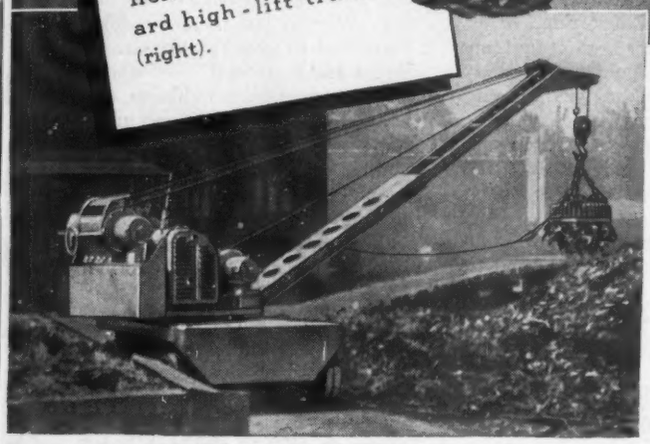


Getting Things Done Quickly...

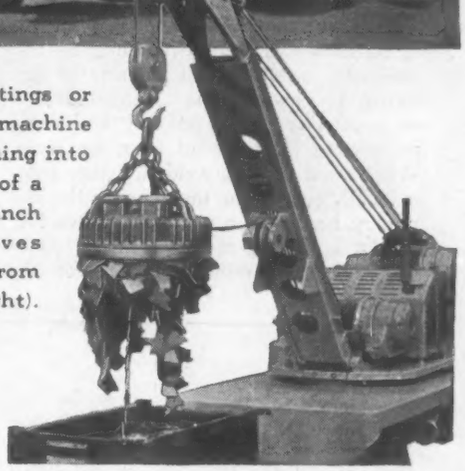
FLOOR-SWEEPING — MATERIAL-HANDLING — ROAD-SWEEPING OPERATIONS WITH EC&M MAGNETS



● For sweeping the production lanes of industry —removing nuts, bolts, turnings, and other tire-injuring scrap from aisle-ways, between machines, from roadways between plant buildings, etc. This 18-inch diameter magnet is operated from battery of standard high-lift truck (right).

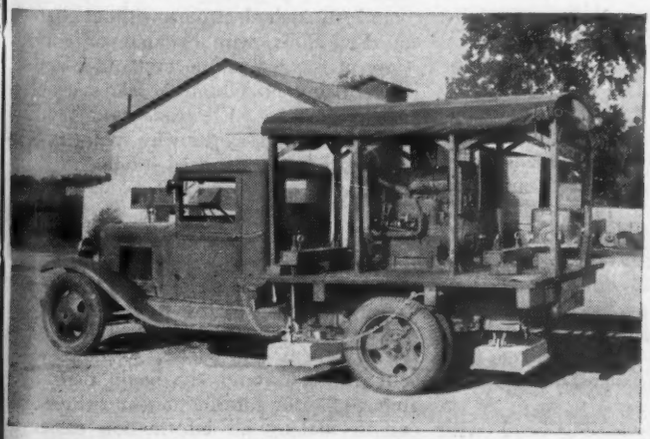


Mobile units for loading scrap into gondola cars. Boom can be retracted and lowered to enter box cars for loading or unloading finished material. 36-volt power-generating unit on truck crane supplies direct current for this 29-inch diameter magnet. "Lift" and "Drop" push buttons are conveniently located adjacent to operator.



For lifting castings or forgings onto machine tool beds—reaching into remote corners of a plant, this 29-inch magnet receives power directly from crane truck (right).

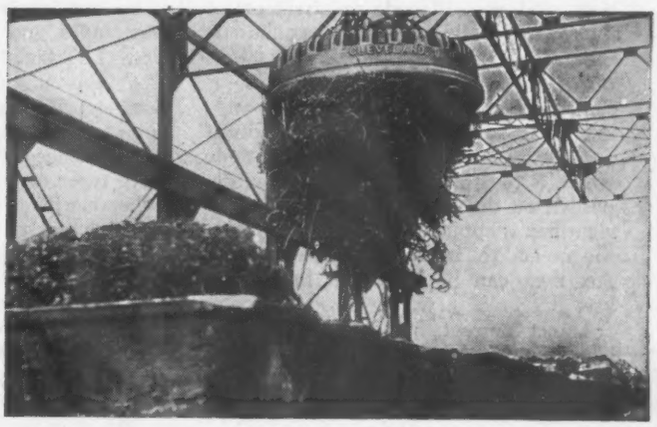
Where large tonnages are handled, the EC&M No. 6D, 65-inch diameter magnet is available. Especially suited for open hearth stockyards—for shipboard use to reduce handling time in ports. EC&M Circular Magnets come in 10 sizes for all industrial needs. Bulletin 900 gives complete data and shows many interesting installations. Bulletin 910-2M gives road-sweeping magnet information. Ask for your copies to-day.

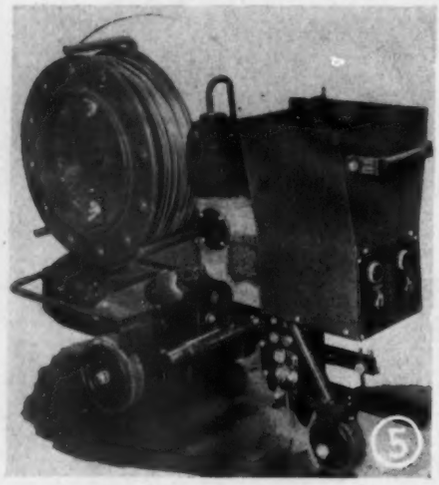


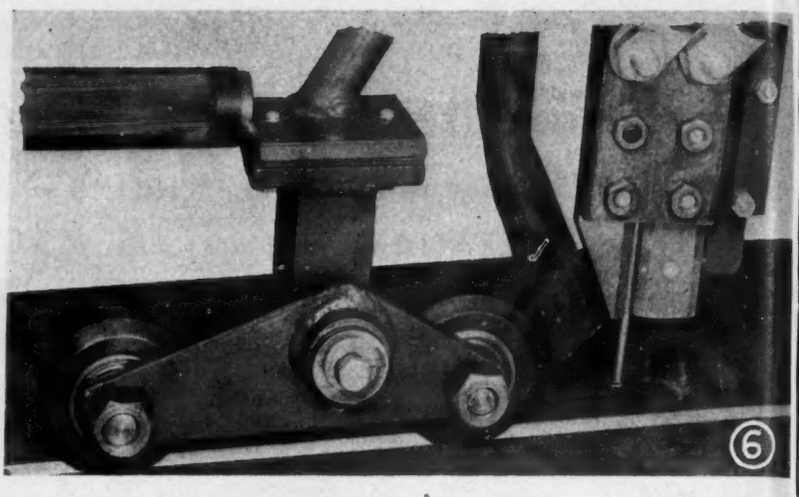
Road-sweeping magnets for removing puncture-producing material from highways, parking lots around industrial plants, etc. Also efficient for clearing airfields of shrapnel and similar tire-damaging material. Gas-engine-generator set, on truck, supplies voltage for these 3 Type M magnets which cover 8-foot wide section of roadway.

THE ELECTRIC CONTROLLER & MFG. CO.

2698 E. 79TH STREET CLEVELAND 4, OHIO







placed in a clamping fixture which clamps the joint against a back-up strip. The automatic head, mounted on a carriage, (Fig. 2) travels along the beam and welds the joint at speeds up to 36 inches per minute. Penetration is 100 per cent and no edge preparation is necessary.

A steel backing ring is tack welded in the heads. Heads and shell are assembled and several assemblies placed in the rotating fixture also shown in Fig. 2. The automatic welding head (similar to that shown in close-up Fig. 1) is mounted on a carriage to permit easy and rapid positioning of the head over the seam. When seam is being welded, fixture automatically rotates the tanks under the stationary head. The weld penetrates into the back-up ring at travel speeds up to 30 inches per minute. Power for the rotating fixture is provided by the exciter of the welding generator. Subsequently, nozzle openings in tank shells and heads are manually arc welded.

Vessels are inspected, tested and stamped in accordance with American Society of Mechanical Engineers specifications, and pass all code requirements of the National Board and Massachusetts codes for unfired pressure vessels.

Completed tanks with compressors installed are shown in Fig. 4.

Process is designed for use with direct current, utilizing a bare metallic electrode which is fed through a granular flux deposited on the joint to be welded. Sufficient flux is applied to completely blanket the arc and the molten metal; the unfused flux then can be reclaimed for further use.

Direct current for such applications offers many important advantages over alternating current: A more simplified and positive control; ability to weld nonferrous materials; and better control of electrode melting rate through the option of either straight or reverse polarity.

Extremely high current densities are used. For example, ⅛-inch diameter electrode may carry as much as 650 amperes. This produces greater penetration and permits smaller cross-section of weld metal, with resulting saving in cost and reduced warpage and distortion.

The welding head on this equipment is normally used in conjunction with a specially built automatic welding set of 1200-ampere capacity. The current rheostat in the automatic control box (Fig. 3) permits a current range of 300 to 1200 amperes. The unit has two exciters, one for the automatic head control and one for the welder field excitation. The welder control box has provisions for easy and quick wiring of the automatic unit.

This development is said to have established its practicability over a period of several years, during which a number of the units have been highly successful in welding machinery bases and beds, motor and generator frames, ventilating fans, tanks and pressure vessels of all kinds, LST landing craft, and many parts used in prefabrication of ships, railroad cars, etc. High quality of the welds so produced is evidenced by test data presented in accompanying table.

All types of joints—butt, lap, tee, fillet and corner joints—are successfully welded by this process.

Fig. 2 shows the welding head, with flux hopper, wire reel and control mounted on a motor-driven carriage. Fig. 5 shows head mounted on portable tractor unit. This has straight wire guide for butt welding. For square butt welding, a pointer is used for following irregular seams. For prepared joints, roller guides are provided for engaging the seam as illustrated in Fig. 6.

Standard head is changed from butt to fillet welding in a few minutes. In making fillet welds, the lower wire guide and flux tube are changed from straight to curved type, thus permitting the head and wire reel to be left in normal position. Wire is fed in at 40 degrees from horizontal to give the maximum effective throat for horizontal fillet welds.

User experience indicates the process is less sensitive to scale and moisture than some automatic welding methods. This eliminates or reduces plate cleaning prior to welding. In extreme cases of scale, buffing with power wire wheel usually gives sufficient edge cleaning, whereas grinding and sand-blasting formerly might have been required.

Other advantages are said to be use of one type and grade of flux, together with one analysis of electrode, with the same procedure for a wide range of steel analyses. For example, ingot iron and steels up to 0.40 per cent carbon can be welded with the same procedure. Special joint preparations, changing of flux, wire analysis and welding procedure are obviated, factors of special importance to manufacturers using automatic welding. Also the equipment will accommodate ⅛ to 7/32-inch electrodes without changes of drive rolls, wire contacts or control. Control is very simple and quick-acting, there being no vibrating relays or electronic devices. Electrode will feed in either direction, as the wire motor is controlled through a special exciter.

MATERIAL (As Welded)	YIELD Lbs. (p.s.i.)	TENSILE Lbs. (p.s.i.)	DUCTILITY (% Elongation in 2 inches)
Low Carbon Steel (such as Armco Ingot Iron)	36,000	53,000	34
Medium Carbon Steel (such as Ship Plate)	49,000	68,000	31
High Carbon 0.40% Steel (such as Gear Steel)	64,000	87,000	24
Pressure Vessel Steel Plate*	55,000	74,000	27

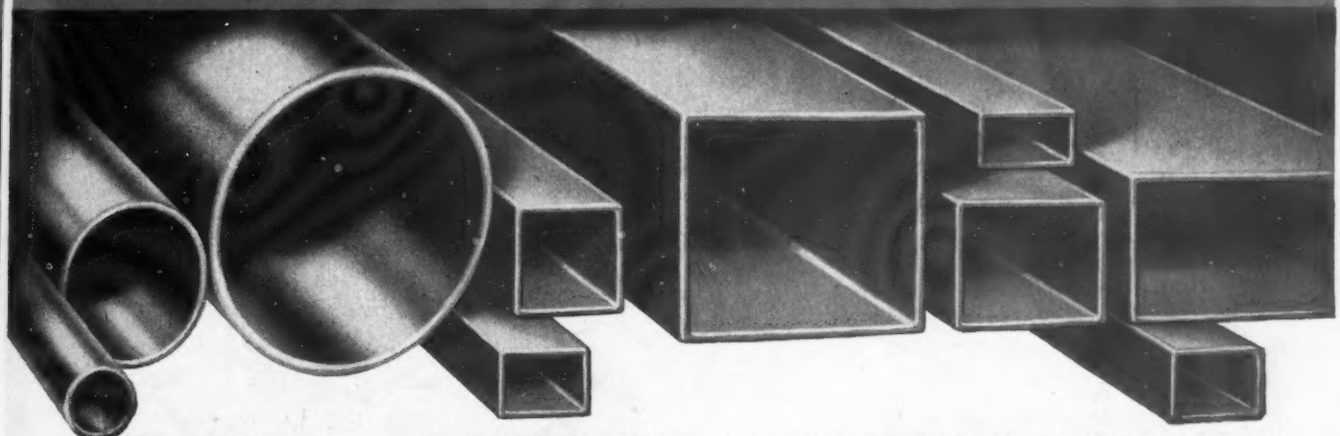
*Stress relieved at 1200 degrees Fahr.

—o—

A new list price book for slotted screws and bolts is available from American Screw Co., Providence 1, R. I. Among its advantages are: Thumb-type, cut-in index, giving the section wanted without paging through the book; rearrangement of price information into three columns, making all information easier to find; standard bundle quantities are shown, enabling distributor to avoid ordering broken-bundle quantities; and book is Kalamazoo-punched for binding, so distributors can bind it in with their own catalogs.

Michigan
WELDED STEEL TUBING

The Modern Electric Resistance Welded Steel Tube



ROUND ★ SQUARE ★ RECTANGULAR and SPECIAL SHAPES

SIZES: ¼" to 4" O. D. GAUGES: 9 to 22

The manufacturing method employed in the production of Michigan welded steel tube results in a uniformly smooth, scale-free surface.

Offered in commercial mill lengths or cut to specified lengths, shaped and fabricated ready for assembly.

Engineering advice and technical help in the selection of tubing best suited to meet your needs.

Michigan STEEL TUBE PRODUCTS COMPANY

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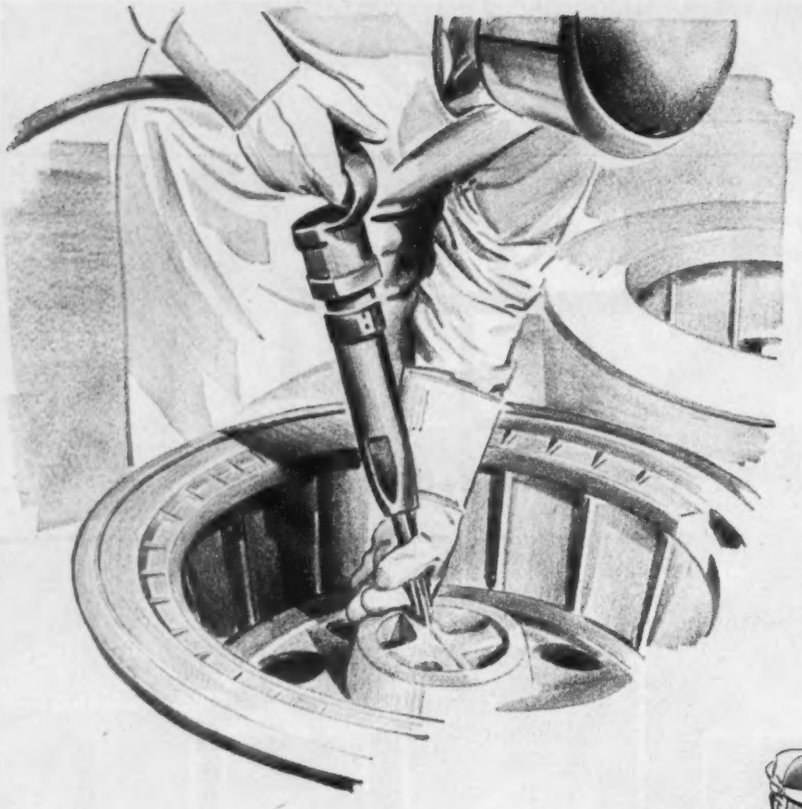
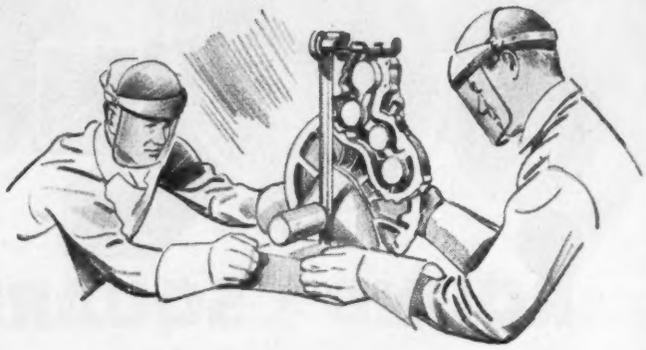


Production men who know magnesium know it is easy to work



Through good shop practice they speed production of new lightweight products

Go to the men in the shops . . . the production men who work with magnesium . . . if you want the real down-to-earth story of its unusual machinability and exceptional ease in working.

They will tell you how magnesium—the lightest of all structural metals—saves time and labor and tools. They will describe its easy sawing, with band and circular saws and also hand and power hack saws, permitting larger cuts per tooth than other structural metals.

And these production men will tell you, too, that magnesium is worked faster and easier than most metals by hand tools—such as chipping tools, drills, burrs, chisels, planes, portable milling cutters.

Shop techniques have, in fact, been developed for all common fabrication methods to speed the output of new products of lightweight magnesium.

Dow men thoroughly familiar with these operations are on call to consult with you at all times.

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THE METAL OF MOTION

MAGNESIUM DIVISION, THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

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Automatic Reversal of OPEN HEARTH Affords One or Two Extra Heats

CONTINUOUS balancing of an open-hearth furnace between the ends at all times, a continuous record of the measured temperature in top checker or fantail zones to give the operator a better basis for control of such factors as rate of driving and air leakage above the floor level, and the measurement of brick temperature at some point in the hotter regenerative zones of fantails or top checker brick by radiation units are some of the advantages afforded by automatic reversal of open-hearth furnaces. In addition, maintenance is reasonable, there is a slight saving in fuel and labor, and some extra heats are obtained out of a campaign. Because of the latter advantage, steps are being taken to install an additional unit.

These facts were brought out at the fourth and last local 1945 spring conference on open-hearth steel sponsored by local section of the National Open Hearth Steel committee of the A. I. M. E. and held at Hotel William Penn, Pittsburgh, May 18. The Philadelphia conference, April 20, was attended by 250 members and guests; the Chicago conference, April 27, by 240; the St. Louis conference, May 4, by 137; and the Pittsburgh conference, 303—or a total registration of 930.

A resume of the Philadelphia conference was presented in STEEL, April 30, p. 102, and the Chicago meeting in the May 7 issue, p. 122. Next year's annual meeting of the Open Hearth committee will be held in Chicago, in April.

Flame Radiation. The open-hearth melter is not as much concerned with temperature of the flame as he is with the amount and energy it supplies for getting the steel melted. Thickness of flame is an essential factor. The all-important phase is to get energy out of the flame into the steel.

At one shop, a sharp decline in the temperature was noted as the flame passes across the bath. When the furnace is working at its best, the highest flame radiation is to be found at the first door. Consensus of opinion is that there is much to be done in the study of flame radiation before any definite information can be given on the tons production, life of refractories, etc. It is felt that flame control characteristics still are in the research stage.

Temperature Measurement of Baths. Discussion of this subject brought out the fact that most of the instruments used for measuring bath temperatures are centered in one spot. One operator voiced the opinion that he at one time questioned the use of the platinum thermocouple with its fragile tube. However, he stated, it is being used both by the English and Americans in measuring electric furnace temperatures and, therefore, must be a practical and cheap way of obtaining the information desired. The problem will be to convince melters that the method of measuring bath temperatures with the thermocouple is practical.

Stopper Assemblies. At a plant in the Pittsburgh district, soft wooden washers, 1 inch thick are employed to absorb the expansion of the brick refractories used in the stopper rod assembly. Emphasis was placed on the straightness of sleeve brick and nozzles as well as having them free from cracks. After pouring, the stopper rods are sent to the blacksmith shop to be straightened and a new head put on. By using larger and heaviest type of head an oxygen lance can be employed 8 to 10 times without destroying the nozzle. New stopper assemblies are suspended at four points in a steam heated oven and are dried in 48 hours at a temperature ranging from 175 to 200 degrees Fahr.

At another plant in the Pittsburgh district, sleeves 5 inches diameter and 9 inches long are put in with Mayport fire clay and the joints are pointed with water glass. The assemblies are suspended horizontally at four points in the drying oven which is equipped with three racks—one for each turn.

Clay nozzles, 1½ inches, are used on low-carbon heats, 2-inch nozzles on structural grades and 2½-inch nozzles on fine grain steels in order to get a faster rate of pouring. Study also is being given at the present time toward the use of 3-inch nozzles. While the larger size nozzle usually results in sloppy pouring, yet this does not show up on the ingots before rolling or on the semi-finished material after rolling.

Warning was sounded that there is not enough care being given to the handling and packing of nozzle brick. When normal conditions are restored, one speaker declared, a demand will be made of manufacturers that sleeves and nozzle brick be packed individually.

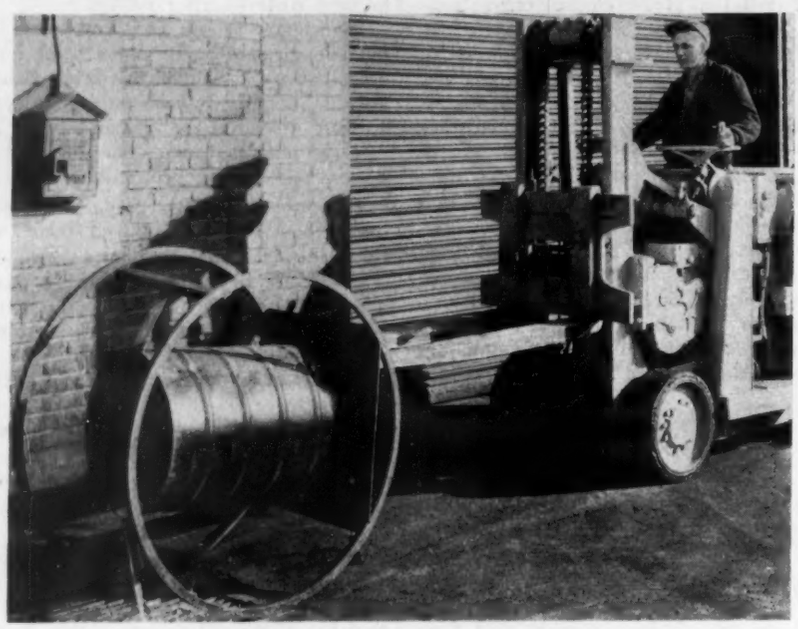
For safety reasons, one Ohio steelmaker has always employed levers on his ladles that raise to pour. However, with bigger heats and longer pouring, a definite hardship was put on the steel pourers in keeping the lever in a raised position. The speaker advised that an ar angement had been patented, whereby the lever is raised to pour two or three ingots, then swiveled around and pulled down to pour thereafter.

Slag Control. One speaker contended it is amply demonstrated that the various slag-metal interactions are predominately controlled by the carbon-oxygen reaction, and that the exact composition of the slag phase is most certainly a variable of secondary importance in determining the state of metal oxidation especially when the bath contains in excess of 0.15 per cent carbon. The carbon content, he stated, is probably the best single criterion for determining the degree of oxidation of the bath itself.

A simplified vacuum-fusion technique has been proposed which will make available a rapid and direct method for determining the true residual oxygen content of steel, which in turn will automatically take into account the secondary effects introduced by variations in bath temperature, rate of carbon drop, slag composition and slag viscosity. A wedge-shaped copper test mold is used in conjunction with a modified vacuum-fusion apparatus. By measuring the amount of gas evolved from heating a small sample, the operator can determine the amount of dissolved oxygen directly from a nomograph which incorporates all necessary corrections. Accurate results are claimed to be available within ten minutes of sampling.

Cleanness of Killed Steel. Experience of a steelmaker in the Pittsburgh district indicates that the type of charge, ranging from all-blown metal to all-cold charge, is not related to steel cleanness. Flux charged in excess of the amount required to maintain adequate basicity for metalloid elimination may be objectionable. Rapid carbon drop is desirable, he stated, but late ore additions should be avoided because of the possibility of incomplete reduction at the time the heat is blocked. Furnace additions of manganese, and of other alloying elements, are definitely advantageous with respect to cleanness and uniformity. The specific ferroalloy employed as a furnace block does not seem critical, provided the oxidizing effect is adequate and the ferromanganese is added promptly.

Furnace additions, he pointed out, are preferable when metallographic cleanness is demanded. Elimination of surface defects in low-carbon killed steel



ROLL-OVER DRUM: Disposal of grinding sludge and other waste becomes a simple affair with this open-top drum which is welded to a metal base plate, framed by two steel hoops and braced with angle-iron. Operator of electric truck slides its fork under base plate, lifts drum off floor and transports it to drain. After lowering it, truck is backed slowly and fork manipulated to tip drum over enough to empty it. Then the drum, devised by Floyd Bliven of General Electric's Erie Works, returns automatically to upright position ready for return to machines it serves

does not appear to be related to metallographic cleanness.

Reladling. This practice, according to one operator, is beneficial in the reduction of aluminum required. The larger the amount added to the second ladle, the more efficient the practice. The speaker warned that any aluminum added to the first ladle in excess of that required to satisfy the oxygen in the metal will probably be lost in reladling.

Another operator favored heavy mold additions of aluminum and advocated the use of aluminum pellets.

A Chicago steelmaker reported his practice averaged 25 per cent aluminum recovery when additions were made to the first ladle and 44 per cent recovery when the aluminum was added in the second ladle.

Subsurface Porosity. This defect in steel ingots was traced to mold coatings by a steelmaker in the Pittsburgh district. Aluminum mold paint was made by using 3 pounds of aluminum paste, 2 gallons of mineral spirits, and 1 gallon of No. 162 aluminum mold wash. The mixture is applied with a spray gun. This, the speaker pointed out, eliminated the defect. More than one coat of aluminum paint was tried but this did not show any advantages, nor was there any improvement when the pouring boxes were coated.

The idea of coating the molds with aluminum, the speaker contended, resulted from experience with heats treated with aluminum for grain-size control. In these heats, subsurface porosity occurred seldom, if ever, regardless of the mold coating. Since beginning the use of an aluminum mold coating, at this particular plant, no subsurface porosity has been found in several hundred heats.

One precaution in connection with the use of aluminum mold paint should be noted. When the ingot is poured too fast, subsurface porosity may result. This probably is due to the inability of the aluminum to act rapidly enough on rising metal in the mold.

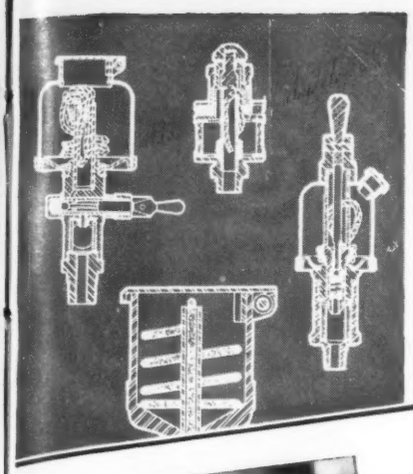
The following explanation was suggested by the speaker for the action of the aluminum mold coating in eliminating subsurface porosity. Splash particles during the pour fall back into the molten metal and cause localized boils, which in turn result in oxides being formed. It may also happen that the splash particles become entrapped by the rising metal. It is likely that the aluminum used in the mold wash, being a strong deoxidizer, will deoxidize any oxide formed during the local boils or any formed in the splash particles themselves.

Nozzles and Stoppers. A satisfactory pouring nozzle must be a compromise between plasticity and high refractoriness. It is true that the more refractory a nozzle, the less erosion, and it is possible to produce a non-eroding nozzle which will pour large numbers of heats with little or no wear. However, such a nozzle because of its refractory qualities tends to restrict the flow of steel because of metal build-up within the nozzle. Some erosion, therefore, is necessary to prevent this building up and consequent stoppage of the steel flow during the pouring operation.

In addition to the degree of refractoriness, a good nozzle must have high resistance to thermal shock. This is important to eliminate cracking and spalling of the nozzle, which is the usual cause of dribbles, leaks and eventually a free-running nozzle. The four principal factors involved in a high-quality nozzle are (1) Low softening temperature; (2) High density (low porosity); (3) Appreciable permanent expansion on reheat to 2450 degrees Fahr.; (4) Good workmanship, freedom from lamination and a uniform burn.

The problem of nozzles cannot be divorced from that of the stopper head used since they operate as a team and under the high temperatures of steel pouring practice, the two units actually weld together and tend to become one indivisible unit except during the actual pouring operation. A stopper head loses its effectiveness for only one reason—it has insufficient resistance to thermal shock. There is little or no erosion of the stopper head itself. Deformation of the head is due almost entirely to spalling, which is caused primarily by cracking of the refractory. Research on this problem has proved conclusively that cracking is due to thermal shock. It is interesting to note that cracks in stopper heads form a definite pattern. Stopper heads sliced in two by a masonry saw indicate a definite crack pattern and with only limited experience anyone can determine the manufacturer of a stopper head simply by the cracked pattern the head forms in service. Some cracks are radial, some spiral, and others form irregular patterns. Scientific sampling of stopper heads by a refractory saw as a general inspection policy has proven of considerable value. Newer techniques of using X-ray for inspection have proven even better since this inspection does not entail the destruction of a certain percentage of the total number of stopper heads used.

Bottom Construction. Replies to the questionnaire on present bottom construction and preferred future bottom construction from 46 open-hearth shops operating 610 furnaces show some definite trends in bottom design. While a large percentage of these operators now use a bottom of burned magnesite, some 60 per cent of them reporting that type of construction, only about 6 per cent prefer to use that type in the future. About 60 per cent indicate a desire to use a rammed bottom. Use of plastic brick sub-hearth is increasing but still has only a minority of backers. Increasing interest is shown in the inverted basic brick arch, but likewise this percentage is still low. A well-burned-in working surface is desired. Most operators expect they will use rammed bottoms. There is a definite trend to more insulation and an average of 3 inches will be used in the future. A 12-inch course of basic brick also seems to be the average size, as indicated in the results.



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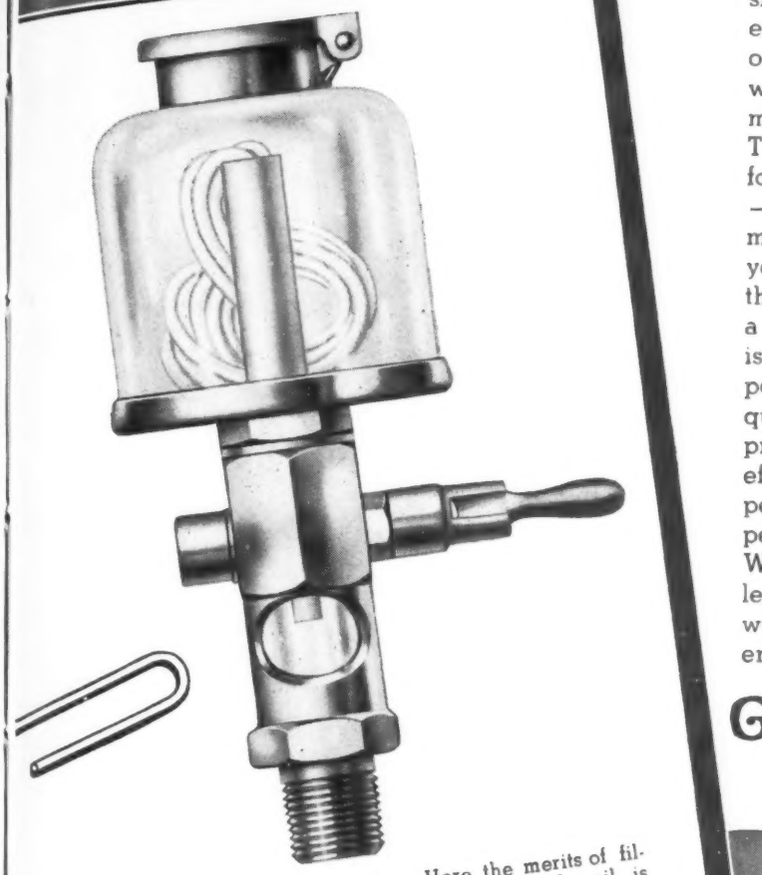
—and each lubricating problem must be considered a problem of special nature if maximum efficiency is to be expected. An inadequate, or outmoded lubricating system promotes friction, which is the basis of unnecessary wear and maintenance—and a serious waste of power. The choice of your lubricating system is therefore more than a mere choice of oiler capacity —it is a scientific problem of capacity, plus method, plus dependable function Whether your problem calls for a lowly oil hole cover that is essentially a short length of tubing with a hinged cover, or a more intricate device that is required to automatically lubricate many points from a central reservoir with a measured quantity of oil at given time intervals—you will practice true economy and insure maximum efficiency and service by employing the experience of Gits Engineers—the kind of experience that has been acquired the hard way When you are faced with a lubricating problem—consult Gits. Request Catalog No. 60 with 172 pages of lubricating devices and engineering data.



Gits "SFD" Sight Wick Feed Oiler. Here the merits of filtered lubrication, as provided by wick feeding of the oil, is combined with the advantages of a large capacity transparent reservoir (glass or unbreakable plastic)—and control of oil quantity which is clearly visible through sight glass in shank. Oil supply is completely shut off when machine is idle. Available in a complete range of sizes and capacities. For servicing distant bearings—the "SFD" Oiler can be furnished with a mounting bracket and half union shank for connecting to copper tubing. Complete details and prices are given on Page 110 of Catalog No. 60—write for your copy.

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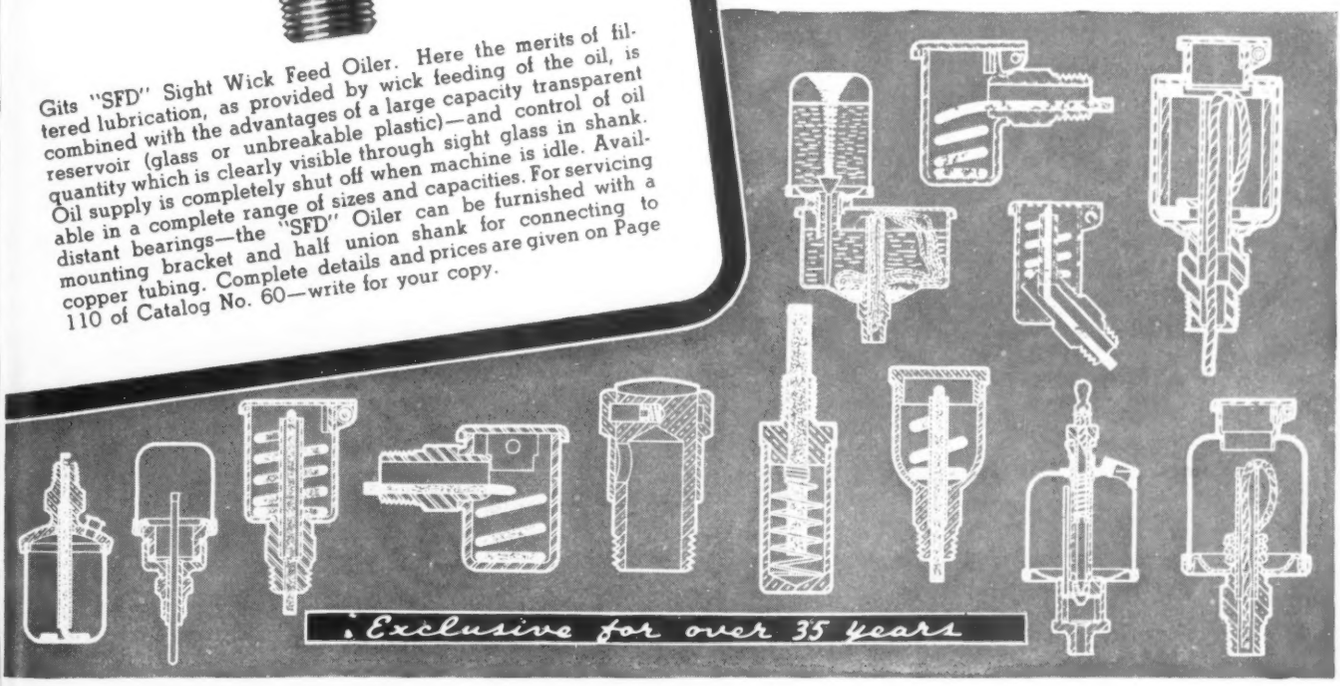

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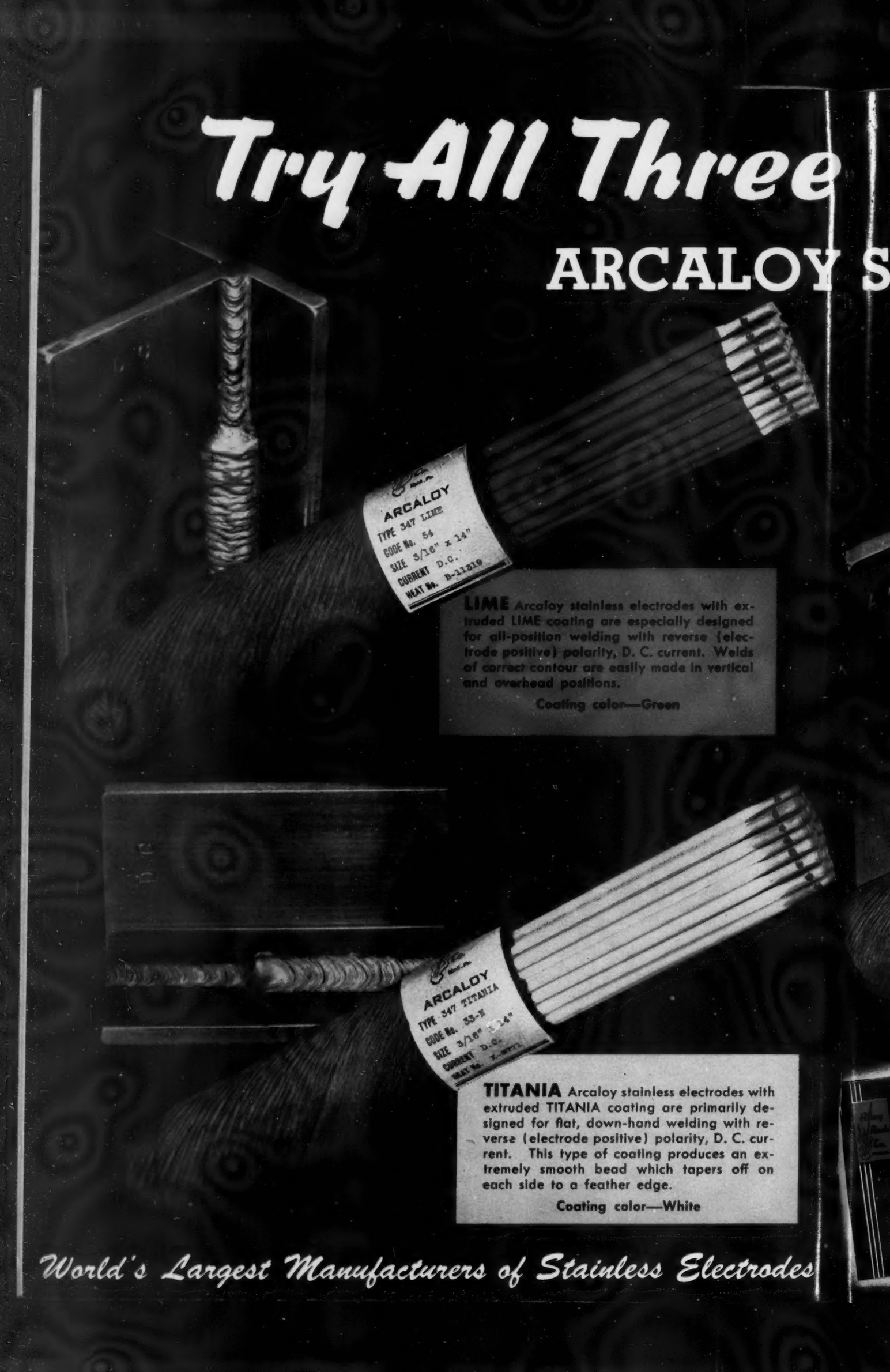

LIME Arcaloy stainless electrodes with extruded LIME coating are especially designed for all-position welding with reverse (electrode positive) polarity, D. C. current. Welds of correct contour are easily made in vertical and overhead positions.

Coating color—Green

TITANIA Arcaloy stainless electrodes with extruded TITANIA coating are primarily designed for flat, down-hand welding with reverse (electrode positive) polarity, D. C. current. This type of coating produces an extremely smooth bead which tapers off on each side to a feather edge.

Coating color—White

World's Largest Manufacturers of Stainless Electrodes

LIME

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AC-DC

STAINLESS ELECTRODES

Only ALLOY RODS COMPANY CAN FURNISH ALL THREE

The Alloy Rods Company is the only manufacturer of stainless electrodes that can furnish all three types of coating. One of these Arcaloy electrodes will fit your shop needs. Try all three to determine the one best suited for your welding requirements.

Physical and corrosion resisting properties will meet all requirements. Arcaloy electrodes are shipped to you in five pound moisture proof packages, boxed in 50 lb. boxes for complete protection against both weather and handling. Get complete details from your local distributor or write Alloy Rods Co., York, Pa.

AC-DC Arcaloy stainless electrodes with extruded AC-DC coating are designed for all-position welding with either AC or DC current. These electrodes will produce smooth beads with low splatter loss and instant arc establishment on all types of AC transformers.

Coating color—Brown

Arcaloy Tool Steel Electrodes for repairing, rebuilding, and composite fabrication of tools and dies are now available—Write for catalog.

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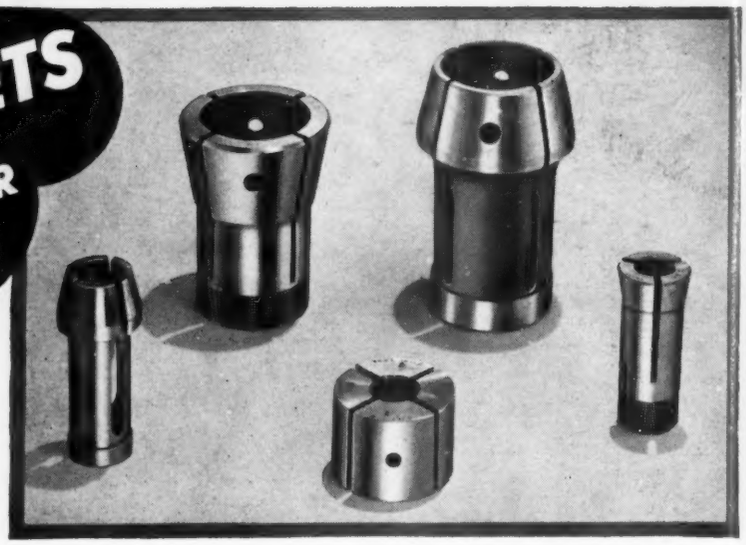
EASIER • FASTER • BETTER AT LESS COST



● Do it fast — do it right — with Zagar Collet Fixtures and Collets. Before you go in for expensive special fixtures, see what Zagars can do on milling, drilling, tapping, slotting, grinding and turning with collets—*without special tooling*. HIGHLIGHTS: holding or indexing with collets, horizontal or vertical position; air-operated or not, fully automatic or manual; load and unload while running; collet lathe chuck.

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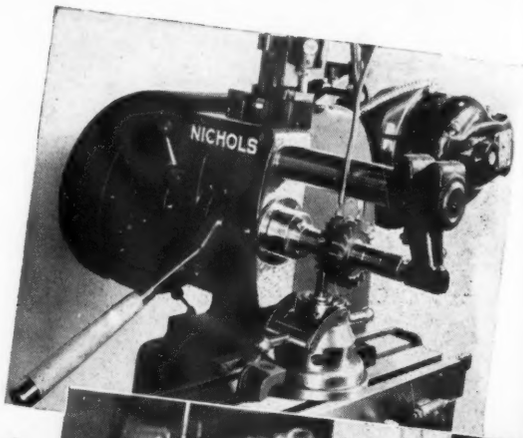
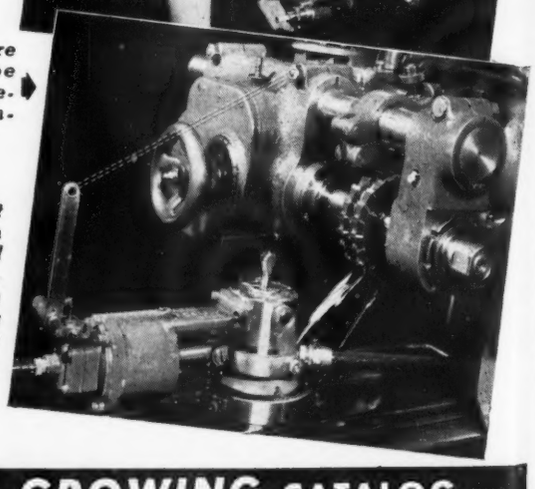
Zagar INDEXING AND HOLDING FIXTURES



Milling squares on the Nichols Miller. Nichols has listed Zagar Index Fixtures as standard equipment; 1" size shown here.

2" Zagar Index Fixture on a U. S. hand mill, milling hexes on bolts.

1" Zagar Lathe Chuck on 9" South Bend lathe, facing off bushings to .001" length tolerance



Zagar 1" Air-O Fixture on a Brown & Sharpe automatic mill, straddle-milling aircraft turnbuckles.

2" Zagar Collet Lathe Chuck on 16" South Bend turret lathe turning a job on which length dimensions and concentricity are all-important

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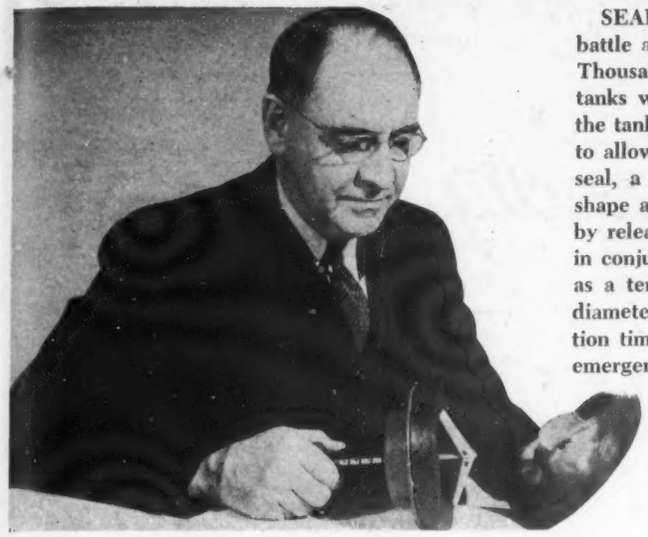
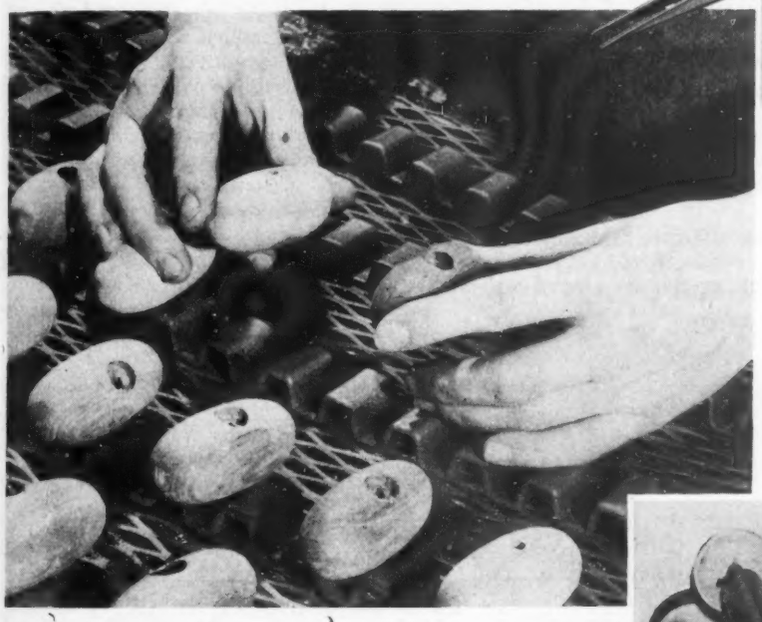
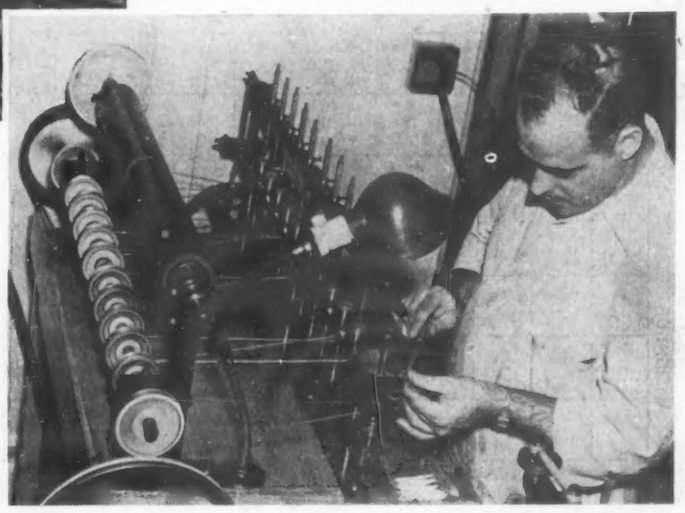


SEAL FOR "WOUNDED" TANKS: Conservation extends to the battle areas when the bullet-hole patching device illustrated is at hand. Thousands of gallons of vital fuel and water, previously lost when tanks were punctured by gunfire, now are retained indefinitely within the tanks by inserting one end of the clamp through the hole far enough to allow the two metal fingers to open up and grip the inner wall. The seal, a rubber ring of spongy synthetic rubber which deflects to any shape and will work on cylindrical or irregular surfaces, is drawn tight by releasing pressure on the spring. United States Rubber Co., working in conjunction with Army Ordnance officers in Detroit, devised the seal as a temporary patch for holes ranging in size from ½ to 4 inches in diameter. It will resist deteriorating effects of oil and gasoline. Installation time is ½-minute. The device suggests possible postwar uses as an emergency hole-plugger.

TWEEZER SPOTWELDER: Tiny elements of a product, so awkward to handle in the fingers that they can be dropped or lost, now may be positioned and welded in place by spot welding tweezers. Instead of carrying metal parts for radio tubes, instruments and other small precision units to the welder, as before, electrodes are applied directly to elements to be joined. Flexible copper leads, plastic covered, terminate in a pair of lugs for connection to standard equipment. Tweezers operate on ½ to 1 kva on 10 amp current. Timer cuts current and times length of weld. New Jersey Jewelers' Supply Co., 280 Plane street, Newark 2, N. J., manufacturer, says they eliminate oxidation, produce cleaner welds up to 50 per cent faster, with as many as 4000 welds per hour, maximum. Copper, nickel, steel, tin, tin alloys, brass, Monel, zinc and bronze parts, as well as nickel to tungsten, and copper to nickel joints, are within their scope.



PUTTING SCRAP TO WORK: Scrap strips from corrugated steel sheets are being used by the finishing and plating department of Glenn L. Martin Co., Baltimore, to hold small parts on automatic conveyors and on hand sprayer racks during painting. Made up in various widths and corrugation dimensions, the strips prevent even the smallest of parts from being blown out of line by force of the spray. They also eliminate cost of gummed tape formerly used, and hold parts more securely. The method is a great time-saver in moving parts to the drying rack.



PUTS SUPERPOLISH ON DIAMOND DIES: Diamond dies must have a very high polish for drawing to size the fine wire needed in many electronic applications. North American Phillips Co. Inc. uses this 10-unit machine for the job at its Dobbs Ferry plant. Each die is rotated by pulleys on powered shaft at left, while a fine needle, charged with diamond dust and inserted in die, oscillates from side to side. This action imparts the high polish required, some dies being called upon to reduce wire to size as small as 0.0008-inch diameter.

A Method for Determining Electric Furnace Capacity

By JOHN McBROOM
Electric Furnace Engineer
Chicago

CONSIDERABLE confusion exists among electric furnace operators and executives as to electric furnace capacities. This article* describes briefly a method which the author has developed to determine the size shell for any size heat. It may not be the best method, but it works, and in the absence of any other available data it may be used. Suggestions and criticism by furnace men are earnestly solicited by the author.

In developing this shell capacity data, an effort was made to establish a recommended ratio of depth to diameter of bath. If the bath is too shallow for a given diameter, too much slag is required to cover a given amount of metal and the heat is difficult to handle. On the other hand, if the bath is too deep, it is difficult to melt metal on the bottom, patch the slag line corrosion properly, and drain the metal from the furnace when tapping.

Conclusions are all drawn from these purely mechanical considerations. For lack of authentic data, the interesting studies of the effect of bath dimensions on metal slag equilibrium as well as the effect of bath dimensions on other physical and chemical reactions which take place during the refining, are omitted.

The angle which the metal surface makes with the furnace bottom is calculated for three different depth/diameter ratios and we obtain the following results:

Depth/ diameter ratio	Angle between metal surface and furnace bottom
1/4	53° 10′
1/5	43° 40′
1/6	36° 50′

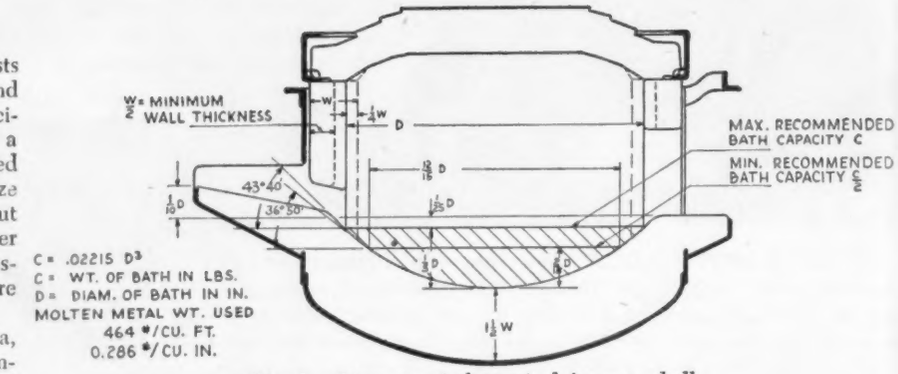

W = MINIMUM WALL THICKNESS
MAX. RECOMMENDED BATH CAPACITY C
MIN. RECOMMENDED BATH CAPACITY C/2
43° 40′
36° 50′
C = .02215 D³
C = WT. OF BATH IN LBS.
D = DIAM. OF BATH IN IN.
MOLTEN METAL WT. USED
464 #/CU. FT.
0.286 #/CU. IN.

Fig. 1—Diagram of theoretical furnace shell

Most electric furnaces are built to tilt a maximum of 45 degrees. Many go over only 40 degrees or even 35 degrees, and some especially large ones tilt even less. This means that for a furnace to drain properly, the angle between metal surface and furnace bottom must be less than 45 degrees. On this basis, the maximum depth/diameter ratio for furnace bath is 1/5. This has been found to work out well in the field. A good minimum capacity, which is one-half the recommended maximum capacity, gives a depth/diameter ratio of 1/6 when using the original bottom contour. This has also been found to work out well in practice. Heats smaller than this minimum capacity are difficult to handle in the furnace.

Fig. 1 shows the diagram of a theoretical furnace shell. Note that dimension W refers to depth of brick only and does not include any backup material. Wall refractories usually remain in service until they are about one-half their original thickness. Maximum shell capacity is figured with one-quarter of the wall brick worn away. This brings the slag line for maximum capacity bath up on the vertical surface of the wall refractories when they are new. This has not been objectionable. When wall refractories are thin, all slag line corrosion occurs on the sloping part of bottom where it is easy to patch.

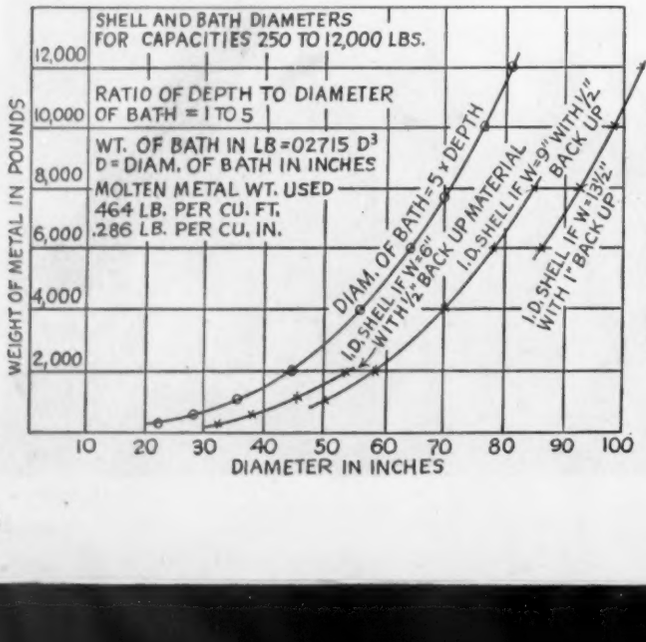
Fig. 2 is a chart showing diameter of bath with 1/5 depth/diameter ratio for any capacity from 250 pounds to 12,000 pounds. This covers most foundry furnaces. Fig. 3 is a chart showing diameter of bath with 1/5 depth/diameter

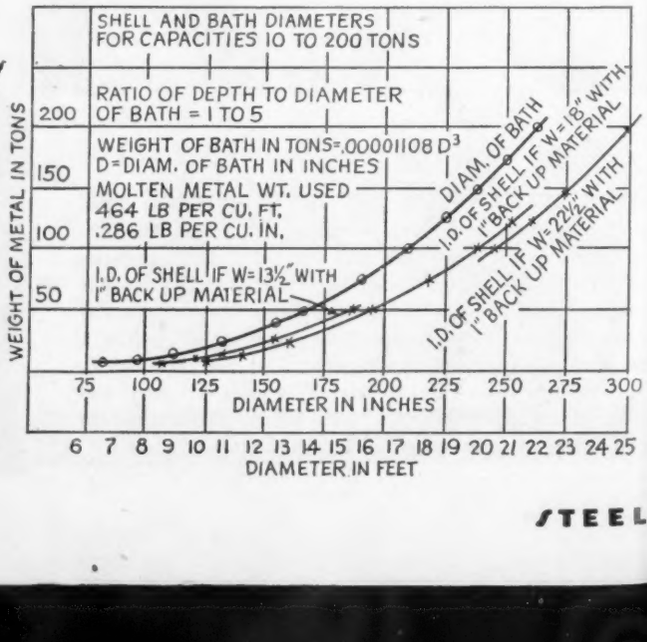
(*Please turn to Page* 155)

*Reprinted from *The Foundry*.

Fig. 2 (left)—Chart showing diameter of bath with 1/5 depth to diameter ratio for any capacity from 250 to 12,000 pounds

Fig. 3 (right)—Chart showing bath diameter for capacities of 10 to 200 tons


SHELL AND BATH DIAMETERS FOR CAPACITIES 250 TO 12,000 LBS.
RATIO OF DEPTH TO DIAMETER OF BATH = 1 TO 5
WT. OF BATH IN LB = .02715 D³
D = DIAM. OF BATH IN INCHES
MOLTEN METAL WT. USED
464 LB. PER CU. FT.
.286 LB. PER CU. IN.
WEIGHT OF METAL IN POUNDS
12,000
10,000
8,000
6,000
4,000
2,000
DIAM. OF BATH = 5 × DEPTH
I.D. SHELL IF W = 6" WITH ½" BACK UP MATERIAL
I.D. SHELL IF W = 9" WITH ½" BACK UP
I.D. SHELL IF W = 13½" WITH 1" BACK UP
10 20 30 40 50 60 70 80 90 100
DIAMETER IN INCHES


SHELL AND BATH DIAMETERS FOR CAPACITIES 10 TO 200 TONS
RATIO OF DEPTH TO DIAMETER OF BATH = 1 TO 5
WEIGHT OF BATH IN TONS = .00001108 D³
D = DIAM. OF BATH IN INCHES
MOLTEN METAL WT. USED
464 LB PER CU. FT.
.286 LB PER CU. IN.
WEIGHT OF METAL IN TONS
200
150
100
50
I.D. OF SHELL IF W = 13½" WITH 1" BACK UP MATERIAL
DIAM. OF BATH
I.D. OF SHELL IF W = 18" WITH 1" BACK UP MATERIAL
I.D. OF SHELL IF W = 22½" WITH 1" BACK UP MATERIAL
75 100 125 150 175 200 225 250 275 300
DIAMETER IN INCHES
6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
DIAMETER IN FEET

How I tipped Smitty off to the new Murex HTS

SMITTY, our arc-welding super, let out a roar that must have carried clear up to the Front Office, waking up half our Brass Hats.

"I'm the boy," he squawked tragically, "that everything happens to! Kindly look at that assembly, Miss Davis."

I kindly looked at the assembly. It was a part he'd just welded. It had cracked.

"It's busted," I said brightly.

"You're —— right it's busted!" Smitty yelled, forgetting I'm just a lady welder, and not a night club babe who is used to such fascinating language. "And I'd like to bust the guy that thought this steel could be welded in the first place. Now what do I do?"

"Being new around here," I said calmly, "I wouldn't know. But I can tell you what the arc-welding super I used to work for did whenever he got in a jam. He put in a hurry call to Metal & Thermit, who make about thirty electrodes they call Murex, and a Murex man would come on the run with the answer."

Smitty began to flare up, the way men usually do when they ask your advice and you give it. But one more look at the cracked welds cooled him off. He called Metal & Thermit.

The Murex man was out the next day with something he called the new Murex HTS or High Tensile Steel rod. In a jiffy he had on welding gloves and a helmet and was making welds without cracks or porosity.

"*This new Murex HTS,*" I heard him tell Smitty, "*was designed to fill a definite need. Because of its moderate penetration and low pick-up of alloys it is an ideal rod for use on many hard-to-weld steels, particularly those of the high carbon and high sulphur types. And it's an all position rod that can be used on lots of jobs where we used to have to weld with stainless steel.*"

The upshot was that Smitty ordered 3000 pounds of the new Murex HTS on the spot. And when I left for the day, he and the Murex man still had their heads together over the new Murex Wall Chart, which gives all the data on Murex's thirty-odd electrodes. I advise you to write for one to tack up in your department. And to save a lot of excitement and agony when some new arc-welding problem comes up, tip your boss off to call or drop a line to:

METAL & THERMIT CORPORATION
120 BROADWAY, NEW YORK 5, N. Y.
ALBANY • CHICAGO • PITTSBURGH • SO. SAN FRANCISCO • TORONTO

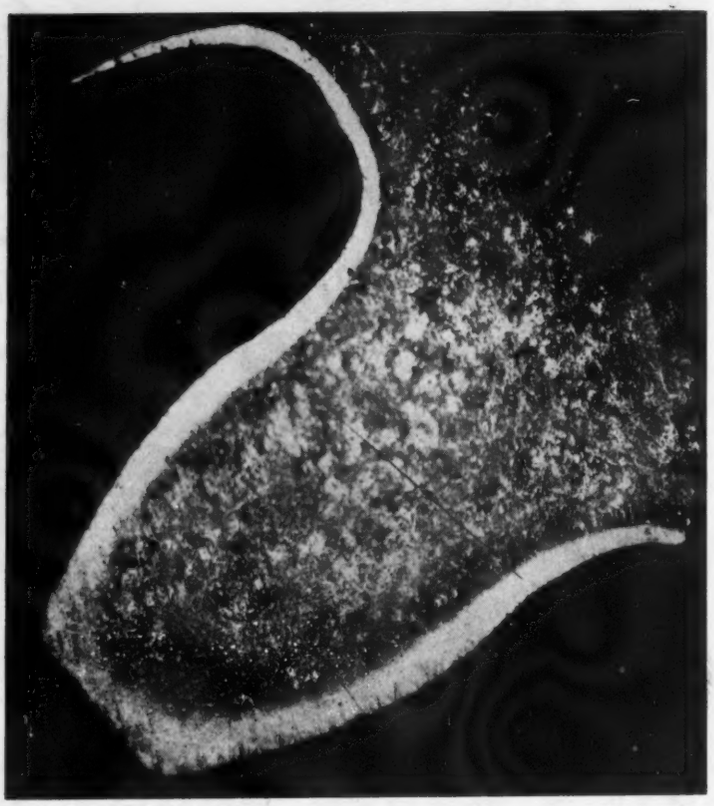
We sort of dreamed up Miss Davis. But Smitty's problem was only too real: it involved Speedcase steel analyzing .20 carbon, 1.25 manganese, .02 phosphorous, .03 silicon and .25 sulphur. The new Murex HTS rod solved it for him—and is solving lots of other arc-welding problems under conditions mentioned in italics above.

MUREX Electrodes

Contour *Hardening Steel* Gear Teeth

By V. W. SHERMAN

Manager
Industrial Electronics Division
Federal Telephone & Radio Corp.
Newark, N. J.



Cross section of SAE-4140 steel gear tooth, hardened by 5 megacycle 25-kilowatt induction heating equipment to a depth of 0.005-inch, with rockwell C hardness 58-60. Magnification about 10 diameters

A TYPICAL recent development in induction heating is the uniform, thin-case contour hardening of steel gear teeth, by the application of high frequency energy in the megacycle range. The gear treated was chrome-molybdenum steel SAE-4140 with 51 teeth, an outside diameter of 2.208 in., diametric pitch of 24 and a pitch diameter of 2.125 in. The equipment used was a Federal 25-kw induction heating unit which gave a 58-60 rockwell C case 0.005-in. deep, in 0.25-sec.

Gear teeth must meet two mechanical requirements for most efficient service. Primarily they must be "tough" or resilient so that they can absorb sudden strain without snapping, and secondly, the surface must be hard to prevent rapid wear. Ideally the depth of the hardened surface must be such that it will insure long wear and yet not affect the resilience and toughness of the tooth.

The complete operation for hardening a gear by high frequency energy consists of placing it on a rotating shaft within the loading coil, revolving it at a predetermined speed for a preset period of time and then dropping it into the quench. The purpose of rotating the gear is to insure that the average distance between any point on its surface and the coil is the same. Since the current at any point on the surface of the gear depends upon its distance from the coil, a uniform distance assures a uniform current which in turn results in uniform hardening.

Results attained also depend to a large degree on the frequency, power and time the high frequency energy is applied. The 5 megacycle frequency and the 25 kw of power output assure that only the "skin" is heated and for such a short period of time that no appreciable conduction of heat is possible to affect the physical properties of the inner layers. The depth of hardening is controlled by the length of time high frequency energy is applied and can be adjusted easily.

Since the time necessary to harden the surface to a sufficient depth can be reduced to as low as ⅛-sec the number of gears that can be case hardened per hour runs into the thousands. The heat treat cost per gear amounts to a fraction of a cent, including amortization of equipment.

New Classifications for Welding Rods Described

New method for classifying welding electrodes now being studied was described by Henry O. Westendarp Jr., General Electric Co., Schenectady, N. Y., at a Cleveland regional meeting of the American Welding Society May 11.

With the new method, the first two digits of the number (example, E6000) indicate minimum tensile strength of the weld in a stress-relieved condition; the third digit the position in which the rod may be used and the fourth digit the power supply, quality of the weld, type of arc (digging, medium, soft) and penetration (deep, moderate, light).

Mr. Westendarp said that 90 per cent of the welding rods made today may be classified by the new system. After selecting the class of electrode for a particular purpose, the user then may readily choose the brand desired.

At the same session, George N. Seiger, president and general manager, S-M-S Corp., Detroit, discussed design for resistance welding, pointing out that proper design and selection of materials are essential. "Don't design for rivets or arc welding and expect to use resistance welding," he said.

Use of propane as a fuel gas is entirely practicable for processing metals where temperatures of 1600-1800 degrees Fahr. are involved, Harris A. Goodwin II, district manager, Bastian-Blessing Co., Chicago, said. Remarkably clean cuts can be made with the use of propane, he said, and bronze welding and brazing also may be readily accomplished.

Malcolm S. Clark, president and general manager, Federal Machine & Welder Co., Warren, O., served as chairman. At the evening session, Dr. Howard E. Fritz, The B. F. Goodrich Co., Akron, O., talked on "The Accomplishments of Modern Research."

—o—

A bulletin entitled "Sundstrand Oil Power Transmission for Variable Speeds," illustrating and describing operating principles, features, possible applications and engineering data of oil power transmissions, is available from Sundstrand Machine Tool Co., Rockford, Ill.

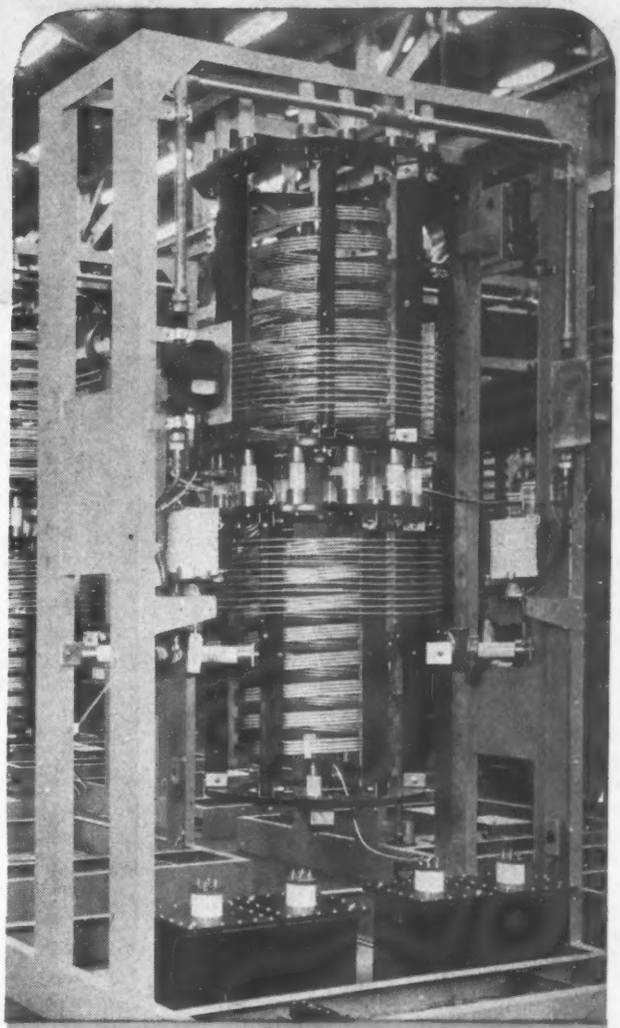
It's a High-Powered Induction Heating Source-

YOU'LL WANT THE PRODUCTION ADVANTAGES OF EQUIPMENT LIKE THIS— BUT—IS YOUR ELECTRICAL WIRING PLANNED TO CARRY THE LOAD?

New, efficient equipment of every kind promises tremendous postwar production advantages. Don't let lack of electrical capacity bar you from such opportunities.

Make sure your wiring plans are based on *future* needs, not *past* experience. Remember, rush teardowns for alterations will be costly. Wire ahead!

Now is the time—while you're in the planning stage—to call in your consulting or plant power engineer, electrical contractor or power salesman. They'll agree *foresighted* wiring will cost a lot less than the "wait and see" kind.



Westinghouse

In this working component of a high-powered induction-heating unit, brief applications of relatively large amounts of power heat metals from within. Heat distribution is quick, uniform.

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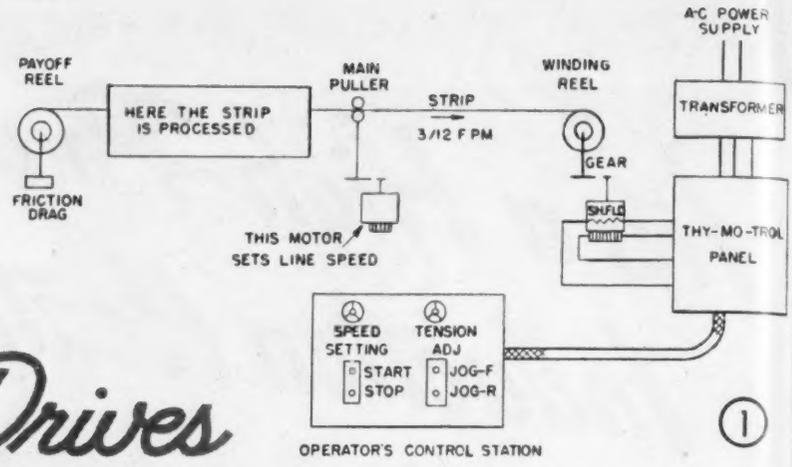
✓ *Check Your Wiring Plans Before They Check You!*

Electronic Drives on Winding Reels for Metal Strip



Motor armature voltage is set in proportion to line speed which in turn can be regulated to conform to different gages of strip. Constant armature current is maintained as the size of coil increases and the motor slows down, thus providing constant tension on the strip during winding operation

By J. H. HOPPER
Industrial Engineering Division
General Electric Co.
Schenectady, N. Y.

ANY DRIVE whose function is to wind material on a coil or spool in such a way that the coil builds up and changes diameter, is a proper application from an engineering standpoint, for a dc motor with automatic control of the motor field, so that the motor speed varies inversely, and the motor torque directly, with the changing diameter of the coil. This results in constant tension on the material being wound, which nearly always is desirable.

However, because of economic considerations, many drives involving small horsepower ratings have been installed in violation of this fundamental conception of constant tension operation. Unfortunately, some of these make-shift drives did not provide even approximately constant winding tension. Others provided approximately constant tension over a limited range of processing speeds, or were limited in range of tension which could be satisfactorily obtained. In some cases, high maintenance cost resulted because of the use of such devices as mechanical slip clutches.

Yet it is sometimes difficult to justify the cost of a conventional dc winding reel equipment, consisting of a dc motor with adjustable voltage control and equipped, in addition, with an automatic tension (current) regulator which controls the motor field with relation to coil build-up.

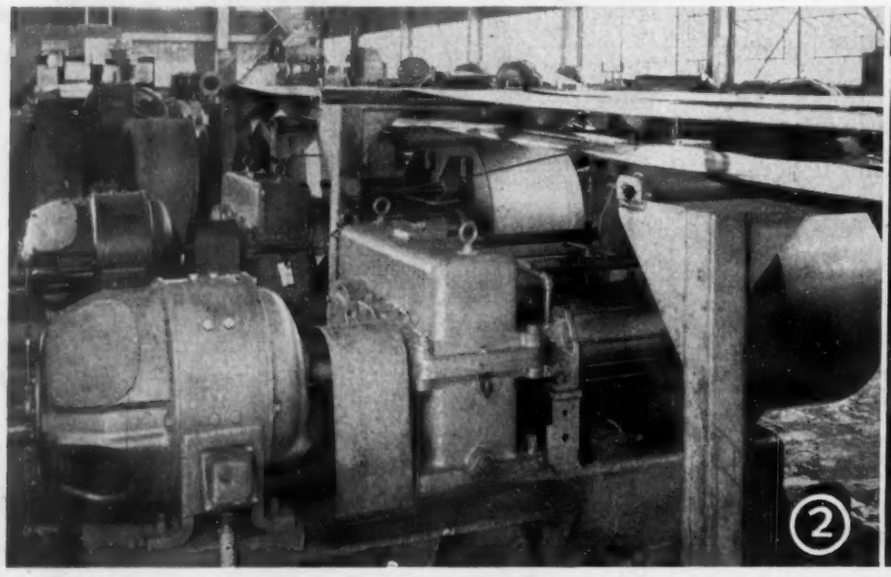
A happy solution of these problems was arrived at in the case of some 2-hp winding reel drives recently installed to replace existing reel drives which had given a number of years of unsatisfactory service. This equipment was on a continuous annealing line for steel strip in a large steel plant. Thy-mo-trol drives were selected for this application.

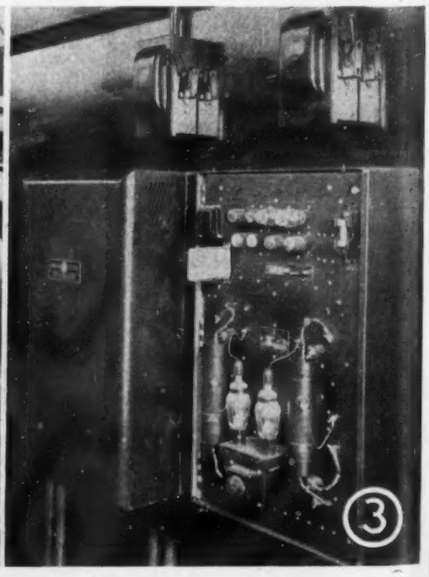
This drive employs a specially designed

Fig. 1—Sketch illustrating fundamentals of drive for winding strip under constant tension

Fig. 2—Two steel strip coilers each driven by a 2-hp motor equipped with electronic drives

Fig. 3—Two Thy-mo-trol drive panels, one with cover removed





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. . . Whatever You Need in Piping Materials

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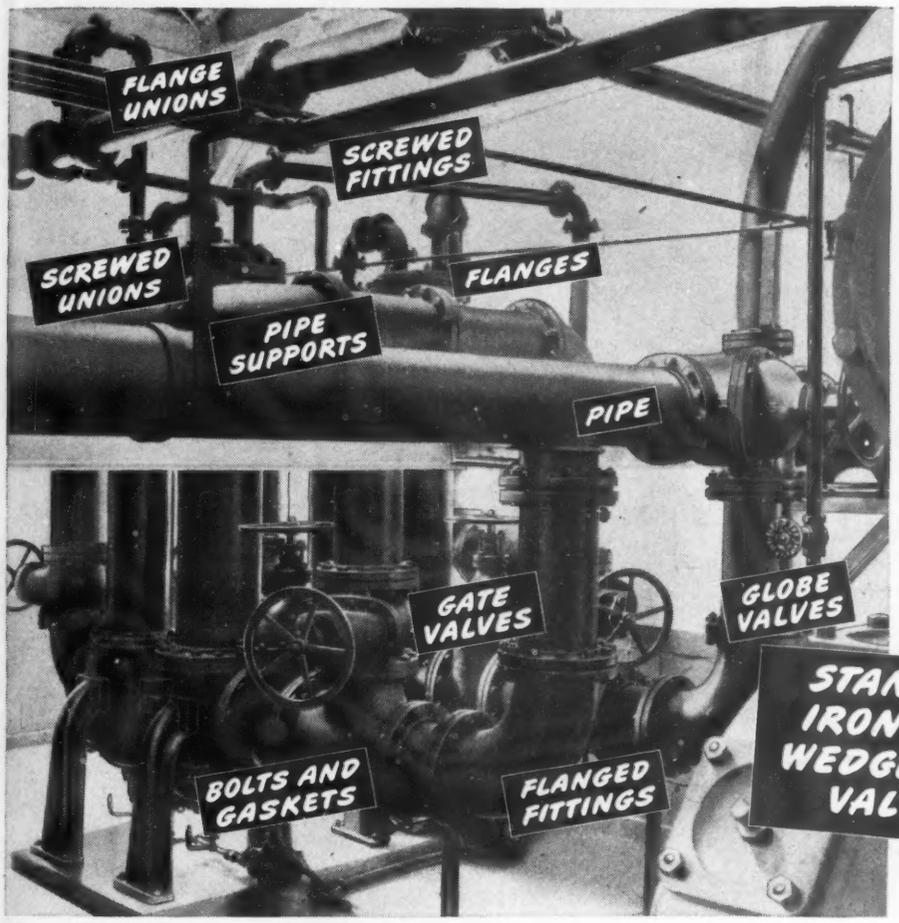
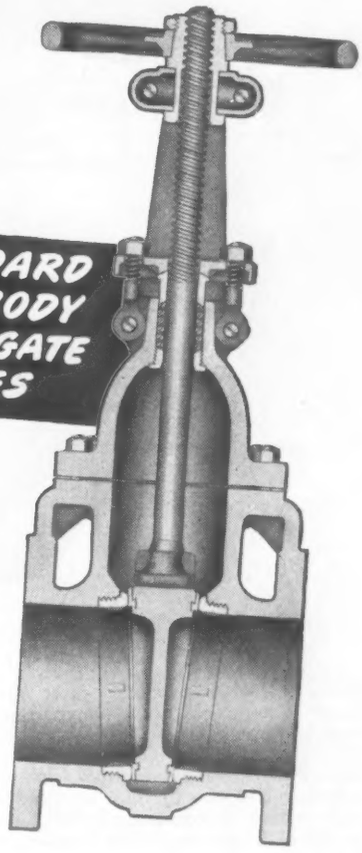
It's easy to simplify and speed deferred replacement work . . . when you take advantage of Crane *complete* piping materials service. *All* your piping needs are supplied by a single source—your Crane Branch or Wholesaler. You get exactly what you need—you choose from the world's greatest line of piping materials, in brass, iron and steel. Uniform quality in all parts—and one responsibility for them—helps you get the best installations. Crane Co.'s 90 years' experience in meeting piping needs assures your complete satisfaction. In Standard Iron Body Wedge Gate Valves, for example, Crane offers the complete line listed below.



Aftercooler hook-up



SERVICE RECOMMENDATIONS: **Crane Standard Iron Body Wedge Gate Valves** with Brass trim are recommended for steam, water or oil lines; all-iron valves for oil, gas or fluids that corrode brass but not iron. Made in O.S. & Y. and Non-Rising Stem patterns.

Working Pressures

Size of Valve	Screwed or Flanged End Valves		Hub End Valves
	Saturated Steam	Cold Water, Oil or Gas, Non-Shock	Cold Water or Gas Non-Shock
2 to 12 in.	125 pounds	200 pounds	200 pounds
14 and 16 in.	125 pounds	150 pounds	150 pounds
18 to 24 in.	*	150 pounds	150 pounds

*For steam lines larger than 16-in., Crane 150-Pound Cast Steel Gate Valves are recommended. (For sizes under 2-in., use Crane Clamp Gate Valves.)

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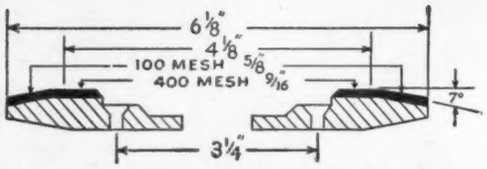
The metal cutting industry is up against tougher metals and closer tolerances. This is demanding fine finishing of carbide tools for greatest cost saving. Until the perfection of the Dual Purpose Super-Cut Diamond Wheel, it meant either time wasted for wheel changes, two cutter grinders (one for rough grinding and one for fine finishing)—or rough grinding used only with the consequent quicker dulling—and more frequent resharpening—with quicker wear-out of tools.

The new Dual Purpose Super-Cut Zurium Bonded Diamond Wheel—with rough grinding and super fine-finishing surfaces on the same wheel—almost automatically eliminates unnecessary extra costs. By merely slight angling the side or point of the tool, the operator—without shifting position—can rough grind, then super fine-finish in 6 seconds . . . This wheel is also highly successful on quartz glass and ceramics.

COMPLETE INFORMATION, literature, and a demonstration will be provided for this new wheel and for all other Super-Cut Zurium Bonded Diamond Wheels. Sold only through authorized distributors and representatives, and always under the name, "Super-Cut." Immediate delivery. WRITE TODAY.



This shows the close relationship of the two separate grinding surfaces. The outer (beveled) surface contains layers of coarse diamonds (100 mesh). The inner (flat) surface is built up of fine diamonds (400 mesh).

The diamonds are locked securely in the matrix—layer upon layer—by our exclusive and secret Zurium Bonding Process.

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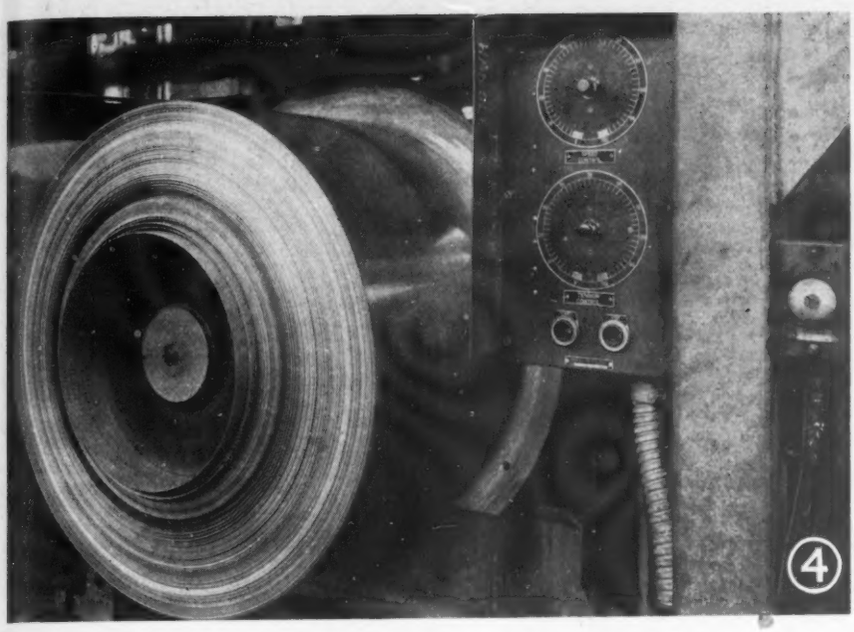


Fig. 4—Operator's control station, mounted at reel it controls

dc motor, with all-electronic control, taking its power supply from the ac power source. One adjustment is provided for setting the motor armature voltage approximately proportional to line speed. The line speed may be changed over a range of from 3 to 12 feet per minute for processing different gages of steel. The coil build-up is taken care of by automatic field control of the dc motor, by which approximately constant armature current is maintained as the coil builds up and the motor slows down.

Since strip speed and armature voltage remain constant as the coil builds up, constant current means constant horsepower, or constant strip tension. This function is built into the "brain" of the electronic control. In addition, the control provides a limit or ceiling on armature current which prevents damage to the motor during rapid acceleration or when the current, for any reason, tends to increase beyond a safe value. Automatic "stalled tension" and dynamic braking also can be provided, if desired, with this type of drive.

Illustrated schematically in Fig. 1 are the fundamentals of this application. It should be noted that the winding reel motor is pulling on a strip the speed of which is fixed by larger machines, so that the action of the tension regulator, or changes in the tension adjusting rheostat, will not affect the speed with which the strip is pulled through the line.

Shown in Fig. 2 are the two motors, respective winding reels. For a slow-speed line such as this, the gear reduction, of course, is large. Fig. 3 illustrates the two electronic control panels, one with the cover removed. The vacuum tubes near the top of the panel are in the "brain" circuit, and the mercury tubes near the bottom furnish the rectified direct-current for the motor armature and field. The operator's control station, mounted at the reel which it controls, is shown in Fig. 4. Some users of this equipment prefer a more elaborate control station, including control for other functions and indicating instruments as well.

Some processing lines require only motors of small horsepower rating for pulling the strip through the line. In such cases, it is sometimes desirable to provide a drive on the winding reel which will do the complete job. Fig. 5 illustrates schematically an installation of this type with a 10-hp Thy-mo-trol drive, in a large brass mill.

Since the mechanical friction in the line determines winding tension, the automatic control of the winding reel motor field must be operated in response to a speed indication from a tachometer generator driven by the strip. In other words, instead of operating as a current regulator, as in the application previously described, this equipment operates as a speed regulator, holding the strip speed constant by slowing down the winding reel motor as the coil builds up.

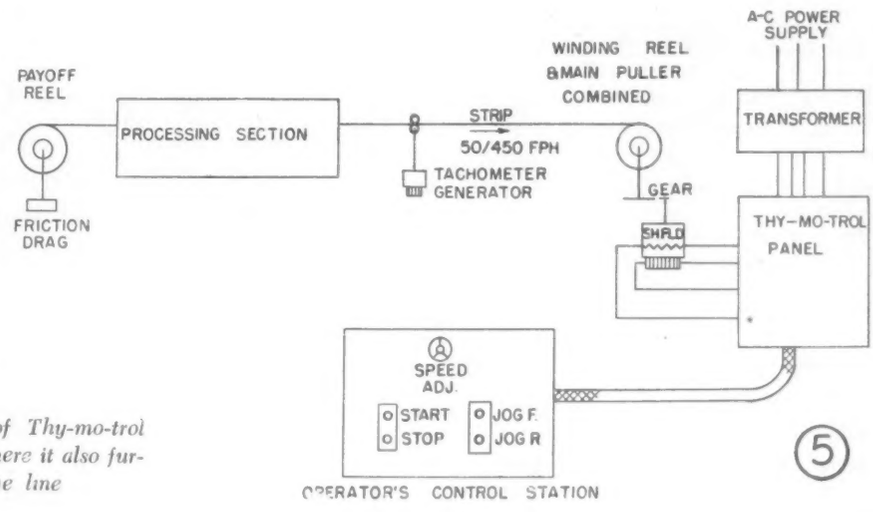


Fig. 5—Sketch illustrating application of Thy-mo-trol drive to winding reel of processing line where it also furnishes main motive power for the line

Insulated Bushings Resist Heat, Vibration

A feature of insulated bushings for radial engine aircraft cowlings available from Bushings Inc., 3442 West Eleven Mile road, Berkeley, Mich., is heightened resistance of mountings to heat. This is due to the fact that metal inner and outer shells of synthetic rubber are assembled without vulcanizing. Bond between metal and synthetic rubber is mechanical rather than chemical. Thus, heat does not affect the mounting until temperatures beyond safe operation have been passed.

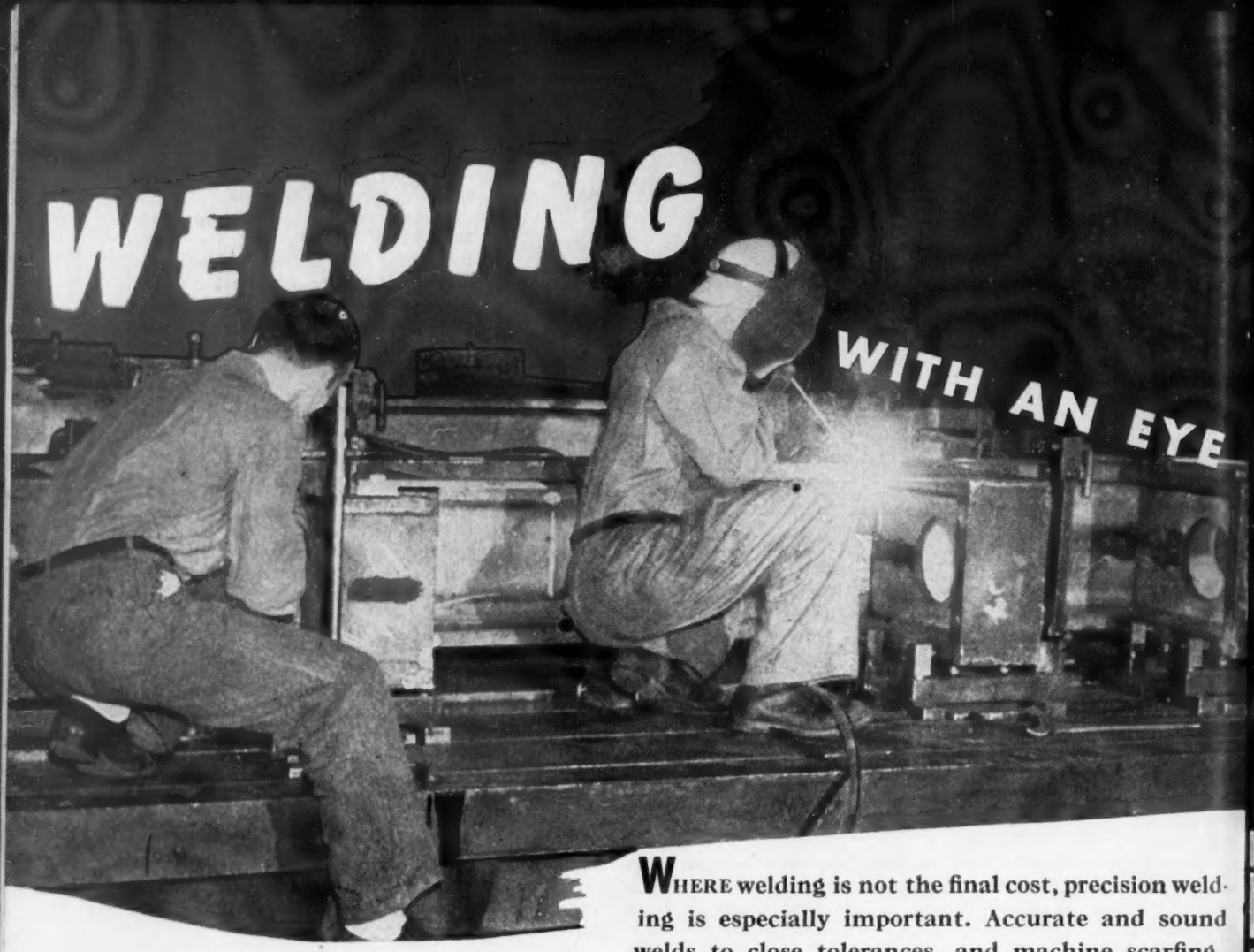
Use of mechanical bond permits use of many combinations of rubber or synthetic rubber with such materials as plastics, wood, steel, brass, powder bearing materials, etc. Elements of assembly do not have to be symmetrical, as the method of manufacturing insulated bushings and mountings can be employed with satisfactory results with component parts of any size and shape, according to the company.

Cowl mountings for military aircraft of synthetic rubber have a high rate of vibration and shock absorption and are said to be impervious to decomposition by oil.

—o—

By encouraging customers to request shipment by air express and by paying half air express charges on each shipment of 3 pounds or less, Walker-Jamieson, radio and electronic distributors, 311 South Western, Chicago, is supplying electronic parts and equipment to industrial plants with unusual speed.

WELDING WITH AN EYE TO



LOWER FINAL COST

The Danly facilities for precision welding and machining at *lower final cost* are now available to industry. For full utilization of these facilities certain specifications are desirable.

1. Work should be to precision standards in which soundness of welds and material, and accuracy of machining are important.
2. Job should be of sufficient size, either in quantity or welding and machining hours to permit tooling.
3. Work should carry a sufficiently high priority to facilitate material procurement.

We would like to discuss your present needs with you either in your plant or ours, or send us your blueprints on welded steel fabrication needed at the present time.

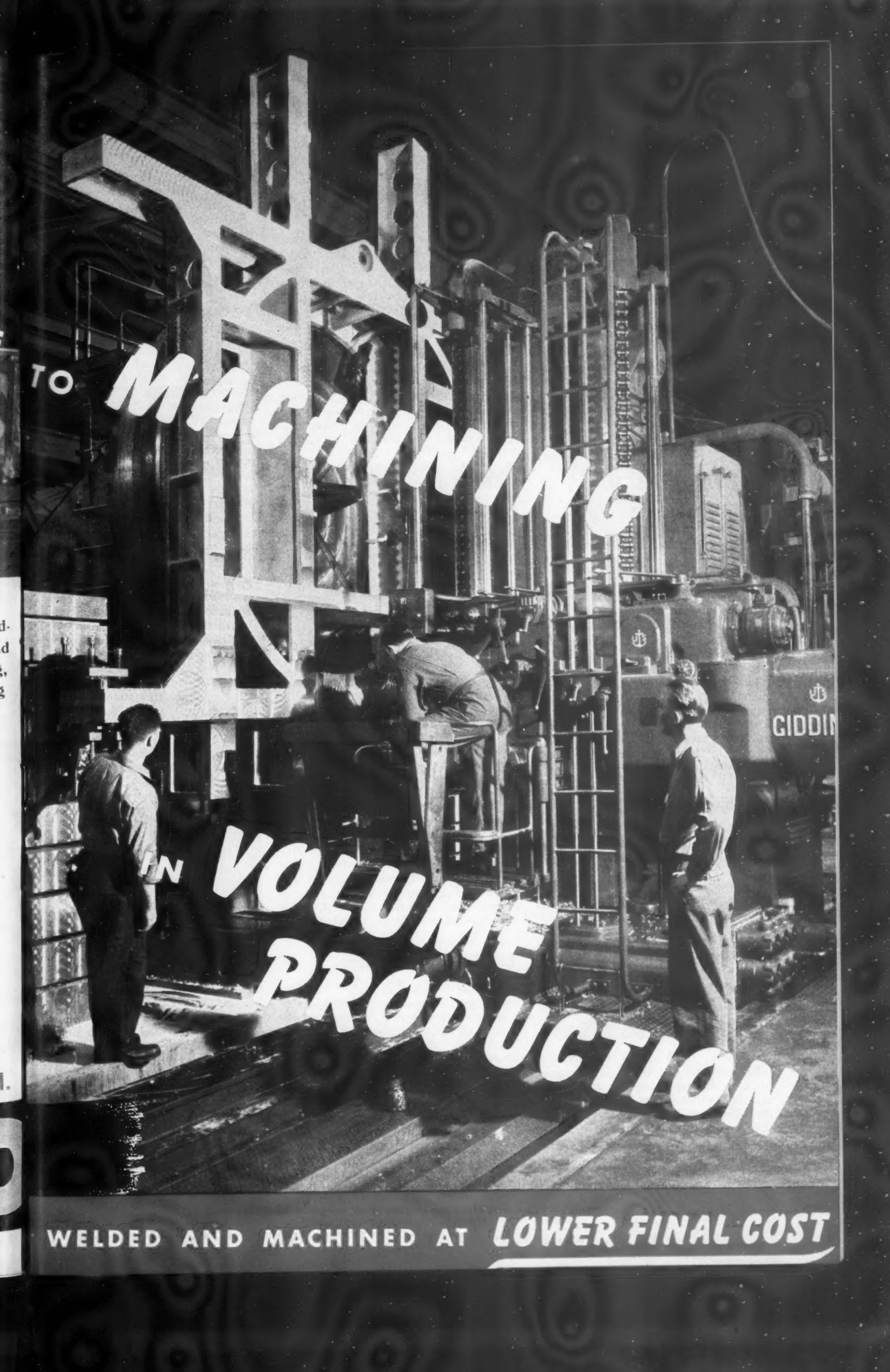
WHERE welding is not the final cost, precision welding is especially important. Accurate and sound welds to close tolerances, and machine scarfing, can effect considerable reductions in machining costs.

Faster machining to precision standards depends upon uniformity in the structure to be machined. Only precision welding can give this uniformity in every piece . . . uniformity that means reduction in machining layout time, fewer machining set-ups, increased machining accuracy.

Fourteen years of heavy section welding and machining experience, including three years producing 40 mm. and 5-inch anti-aircraft gun mounts to exacting Navy specifications, have given the Danly organization the planning knowledge and the production skill to produce precision weldments and machine them to precision standards at *lower final cost*.

DANLY MACHINE SPECIALTIES, INC. 2100 S. 52nd Ave., Chicago 50, Ill.

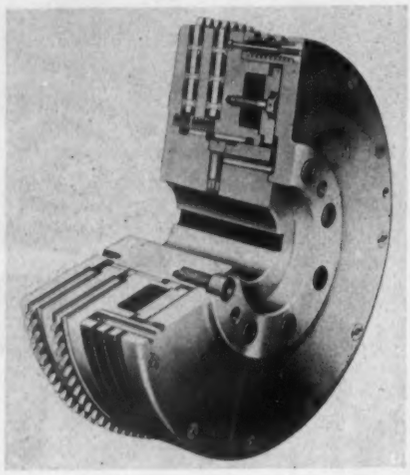
DANLYWELD


TO MACHINING
IN VOLUME PRODUCTION
GIDDIN
WELDED AND MACHINED AT LOWER FINAL COST

INDUSTRIAL EQUIPMENT

Air-Actuated Clutch

For remote control setups and where feather-touch engagements in heavy duty operations are necessary, a new air-actuated clutch is introduced by Twin Disc Clutch Co., Racine, Wis. Known as model P, it has a hub and back plate,

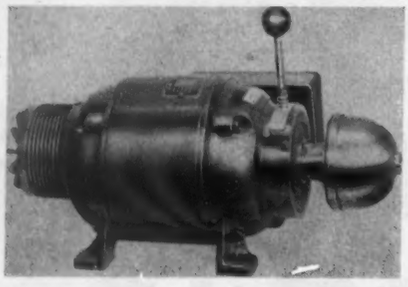


center plate, floating plate and friction disks. It is available in sizes from 14 to 36 inches and capacities 65 to 895 horsepower. The device operates by remote control. Any amount of air pressure, within limits, can be applied to the friction plates to provide either slow or fast engagement.

Model P design provides two different methods for handling the actuating air supply, depending upon where the clutch is mounted: First, by drilling the shaft and using an end shaft rotary air seal; second, by using special shaft-a-round, or midshaft rotary air seal.

Polishing Lathe

A new polishing lathe for odd shaped parts is announced by Crozier Machine Tool Co., 684 North Prairie avenue,



Hawthorne, Calif. This vacuum grip polishing lathe handles parts of copper, brass, aluminum, magnesium, zinc, plastic and steel, which cannot be held by chuck or collet, such as oil can bodies, spun shapes and flat stampings. It generates its own vacuum without piping or glands; starts, holds the work, stops instantly and releases work rapidly.

The unit is available with an 1800 or 3600 rpm, 220-440 or 550 volt, 3 phase 50 or 60 cycle motor.

Measuring Instrument

Model N-5 internal measuring instrument offered by Sheffield Corp., Dayton, O., embodies both mechanical and electrical principles. It is equipped with an electric gaging head known as the Electrigage, an improved amplifying device (2500 to 1).

A new type of electrical magnification causes instantaneous action of the indicator hand, giving a quick, positive reading. There is no lag and the stylus has a feather touch so that gaging pressure need never exceed 3 ounces. A fine adjustment knob is used in obtaining a zero setting. An automatic stabilizer

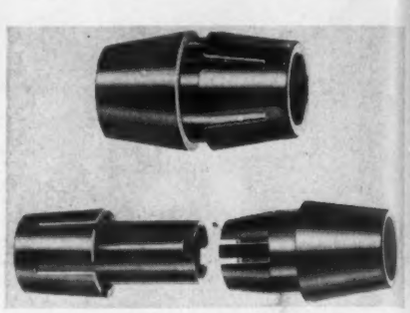
prevents ordinary voltage variations from affecting accuracy of the ratings. A limit switch arrangement operating two red signal lights assists the operator in making the setup and in properly positioning the work for checking.

Gaging range includes minimum and maximum gaging diameters of 0.370-inch and 12 inches respectively. The surface plate is adjustable vertically, giving a gaging from the surface plate to center of diamond points of 1/16 to 1½ inches depth of hold may be checked.

Blind Plastic Grommet

For insulation and protection of cables and lines passing through bulkheads of ships and aircraft and for many applications of electrical insulation, the noninflammable plastic blind Des-Grommet is announced by Victory Mfg. Co., South Pasadena, Calif. It is composed of two parts molded from a noninflammable formula of Lumarith. The two parts are designed so that they may be applied from one side only by means of a special tool. To install the grommet, it is slipped on to a special tool and thrust through a hole in the partition. As the grommet is drawn together, an undercut section on one half is engaged with a spring locking section on the other. The tool then forces the two sections together, locking them into one integral unit at the point at which the partition stops further movement.

They are furnished in a wide range of

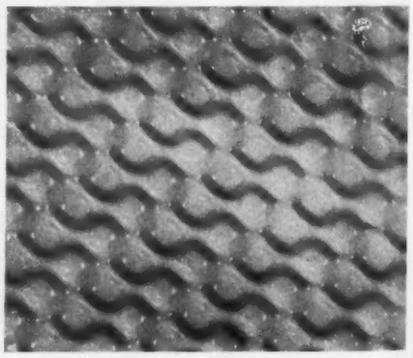


sizes to accommodate cables and tubes from ¼ through 2 inches in diameter. Two sizes for wall thickness are supplied, one to accommodate 1/8 to 1/2-inch and the second for bulkheads 1/2 to 1 inch in thickness. Unlimited colors are available in suitable plastic materials.

Formed Metal Sheet

Rigidized metal is ideal for adaptation to porcelain enamel sheets and panels for store front installations. Rigidizing process is a new method of cold forming sheet metal in which the metal is scientifically distributed throughout the cross-section, giving extra strength and patterned surface effects and producing marked changes in mechanical, textural and utility values.

Rigidized sheets eliminate the problem of "waves" in the flatness of panels for



architectural use. They are available in a wide range of designs from Rigid-Tex Corp., Buffalo 3, N. Y. However, two definite patterns are particularly attractive and practical for adaption to porcelain enameling.

The coarse pattern, ACC-4s, is suitable for use as a sign panel with either block or cutout letters set away from the panel, thereby creating an unusual effect which may be enhanced by a blending of colors and highlights on the porcelain enameled sign panels and by installation of neon

(All claims are those of the manufacturer of the equipment being described.)

IN 8 MINUTES
Transfax Reproduces Drawings DIRECTLY ON METAL!

1. Prime

2. Spray

3. Print

4. Hose

5. Spray . . . and Fabricate!

How New Kodak Transfax Process Can Make Such Surprising Savings

TRANSFERRING drawings to metal by the new Kodak Transfax Process is remarkably simple and quick. And Transfax reproductions are line-for-line . . . dimension-for-dimension. Every detail is shown with unvarying accuracy, regardless of the size of the part to be fabricated.

You buy no special equipment. The entire process can be handled in ordinary room light—by anyone . . . without lengthy training of operators. Step by step . . .

1—Using an ordinary spray gun you coat any nonporous sheet material—metal, plastic, rubber—with Kodak Transfax Primer.

2—Now, apply the quick-drying Kodak Transfax Spray.

3—Place the original drawing in contact with the coated metal . . . expose briefly to arc or mercury vapor illumination.

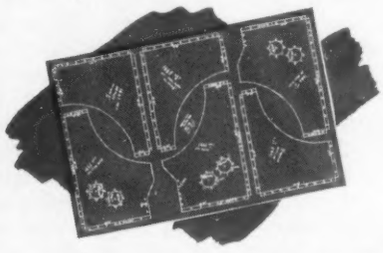
4—Pour on a weak ammonia solution . . . hose with warm tap water . . . and your drawing is on metal!

5—Spray on a thin overcoat of Primer and your reproduction is ready to stand a lot of rough handling.

Kodak Transfax Process withstands bending, shearing, punching—even the cutting torch.

Efficient, economical, and fast, the Kodak Transfax Process speeds sheet metal fabrication in many ways . . . where layouts are complex . . . where detailed instructions must go on the metal . . . where reproductions are needed in quantity. For full information write: Eastman Kodak Company, Rochester 4, N. Y.

Simple or Complex . . . It's all one to the Transfax Process. Layouts as relatively simple as this or far more complicated are reproduced with equal ease and accuracy. Another plus factor of the Transfax Process is that drawings can be positioned so that several small parts on different drawings can be laid out on a single sheet . . . speeding production, reducing scrap loss.

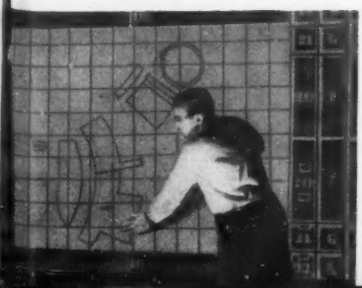


Blueprint on Metal: The advantages of a Transfax layout carry right through production. The worker in the shop doesn't have to refer to blueprints . . . take time to interpret, calculate dimensions. Forming lines, bend radii, drill-hole sizes and locations, part numbers—everything in the original drawing is reproduced on the metal.

Line-for-line Accuracy: With manual drafting eliminated, copying errors and time-consuming checking and rechecking of details are out . . . with Transfax, each line, dimension, note on the original drawing is printed directly on the metal without chance for error.

KODAK TRANSFAX PROCESS

SAVES TIME . . . ENDS ERROR . . . SPEEDS PRODUCTION



THE KODAK LINAGRAPH TRANSFER PROCESS is another Kodak development for the reproduction of working drawings on metal or other sheet materials. In this process, the metal, plastic, or plywood sheet is sensitized by lamination with Kodak Linagraph Transfer Paper . . . drawings are reproduced with photographic speed and accuracy by contact or projection. If the contact method is used, the line-for-line duplicate of the layout is always identical in size with the original. The projection method permits variation in scale . . . especially valuable when shrink templates or experimental models are needed. Whichever method is used, the reproduction is photographically accurate, and photographically complete, to even the most minute detail.

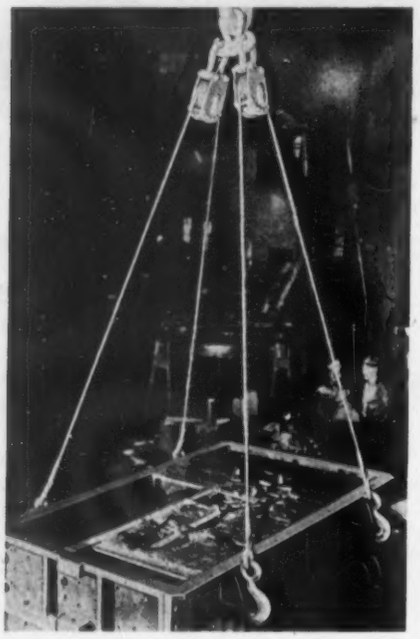
Kodak

tubing in the hollow backing of the block letters to accentuate this blending of colors. No. 1-ACC is a finer pattern of distinctive design.

The use of these metals will not interfere with the normal fabrication methods used for the materials involved.

Automatic-Leveling Slings

Caldwell Level-Lift slings in 3/4, 1½, 3 and 6 ton capacities are offered by Macwhyte Co., Kenosha, Wis. After the light-weight block containing wire rope is put on the crane hook, the crane operator spots the crane hook over the approximate center of gravity of the load and the floormen attach the sling to the load. The operator then applies the



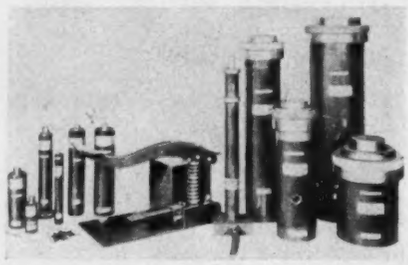
power to lift the load and as crane hook is lifted, rope automatically adjusts itself through the Level-Lift block. In so doing, one sling leg of rope becomes longer than the other and as weight of the load pulls on the wire rope, sheave in the block pulls down against a brake which prevents slippage. The load is then lifted level.

If the crane operator does not get the block and crane hook close enough to the center of gravity of the load, it is only necessary to lower the load enough to relieve tension on the sling which releases the brake and then move the crane hook over a little to true center of gravity. On applying power, the ropes readjust themselves and load rises level.

Hydraulic Rams

Reimuller Brothers Co., 9400 West Belmont avenue, Franklin Park, Ill., announces a new line of single acting rams. Using 4200 psi as the basic pressure, a complete range of lightweight steel rams are available for assisting motivation or supplying force in many applications. Sizes available vary from ½ to 6 inch diameter. They supply forces from 500 pounds to 40 tons if used with standard foot power units or motor driven pumps and valves manufactured by the company.

These rams are easily serviced and



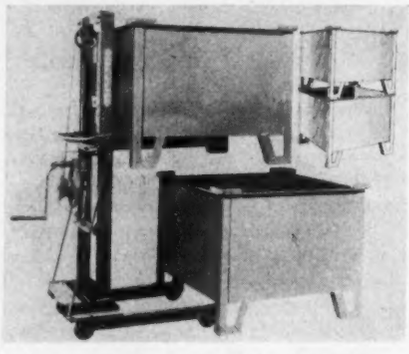
most of them can be provided with spring return. When used with 1 cubic inch per stroke foot power units, movements from 0.1 to 4 inches result.

Shear Attachment

Quickwork Division of Whiting Corp., Harvey, Ill., announces a new cutting attachment for use on any of the company's rotary shears. This attachment is used to cut the arc on cross-cut saws which vary in length from 2½ to 7 feet. The cut is done by a continuous movement of the attachment.

Storage Bin

Designed for a large metalworking plant for handling small parts in course of production, a new all steel storage bin of the stacking type is offered by Palmer-Shile Co., 796 South Harrington avenue, Detroit 17. Corner plates allow for con-

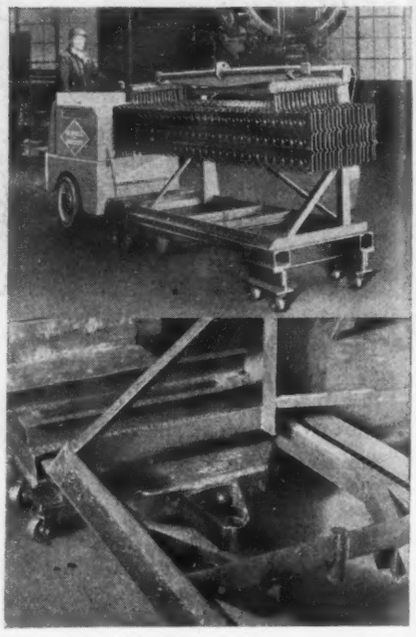


venient stacking and storage. Four-way entrance permits pick up from any one of four sides. The unit may be handled with hand or power lift truck or fork truck. It can be tiered with portable elevator, high lift or fork truck and is made of heavy steel plate with legs and corner reinforcements of angle iron.

Handling Dolly

To overcome problems in the manufacture of landing mat strips where handling and transportation of large unit loads by electric industrial trucks presented difficulties due to the dimensions of the material, an auxiliary dolly mounted on casters which can be moved about manually to a limited degree and transported between various operating departments by an electric truck has been developed by Elwell-Parker Electric Co., 4205 St. Clair avenue, Cleveland.

The dolly was made by welding flame-cut parts of standard flat rolled shapes. A steel fitting bolted to the forward end of the company's power truck platform provides for a pin connection between the base frame and the truck. Truck lifts only one end of the dolly and can either push or pull the load through nar-



row aisles and around corners with safety. While designed especially for handling landing mat strips, it can be modified to accommodate other types of material in long lengths such as tubes, bars and small trusses.

Paper Dielectric Capacitors

Developed primarily for grid and plate-blocking service in the electronic-oscillator circuits of high-frequency induction heating equipment and in other high-frequency oscillator circuits of a similar nature, a new line of high-frequency paper dielectric capacitors, available in ratings of 5000 to 20,000 volts direct current, 0.01-microfarad, is announced by General Electric Co., Schenectady 5, N. Y.

The internal kraft-paper and aluminum foil assemblies, compactly arranged and thoroughly impregnated with a low-loss liquid dielectric, are hermetically sealed in rectangular metallic cases. The size of the case cover and the overall dimensions of the capacitor is reduced by use of a single insulated terminal, provided with a threaded terminal stud. For the other terminal, a stud is provided for connection to the case cover.

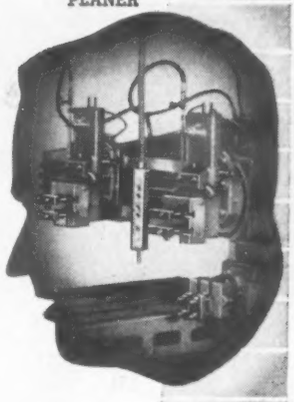
The units are supplied with removable footed-type brackets, which provide for a firm four point mounting in any position. The 20,000 volt rating is available in two designs.

Rockford Hy-Draulic SLOTTER

Rockford Hy-Draulic OPENSIDE SHAPER

Rockford Hy-Draulic SHAPER

Meet the "Heads" of a Famous Family



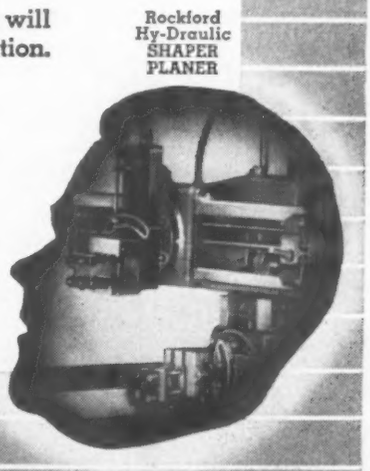
Rockford Hy-Draulic OPENSIDE PLANER

All these "heads" have one important factor in common. Each shows a means of using hydraulic power for smooth, precise, rapid cutting of metal. These are the heads of various Rockford Hy-Draulic machine tools.

When you seek machine tools for economical and profitable operation in a competitive world, investigate the advantages of Rockford Hy-Draulic Shapers, Planers, Slotters and Shaper-Planers. Easy, fast operation; and exact combinations of speed and feed for maximum production are two of many features in Hy-Draulic design which cut costs and increase production.

Bulletins are available describing the following Rockford Hy-Draulic machine tools: Shaper—12" stroke; Shapers—16" to 28" stroke; Openside Shaper—36" stroke; Planers, Openside and Double Housing, up to 60" x 60" and 20-foot stroke; Slotters—12", 20", or 36" stroke; Shaper-Planers 42" to 144" stroke.

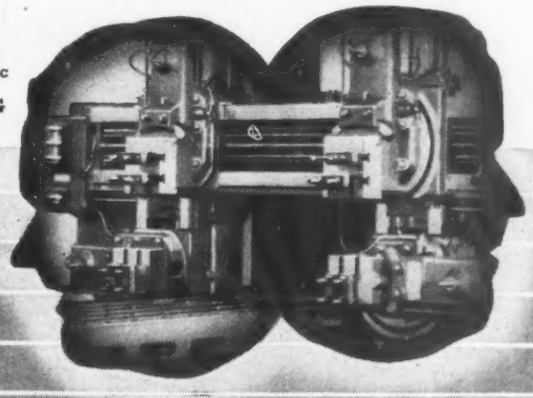
Copies of any and all bulletins will be sent without charge or obligation. Please address Dept. 2901.



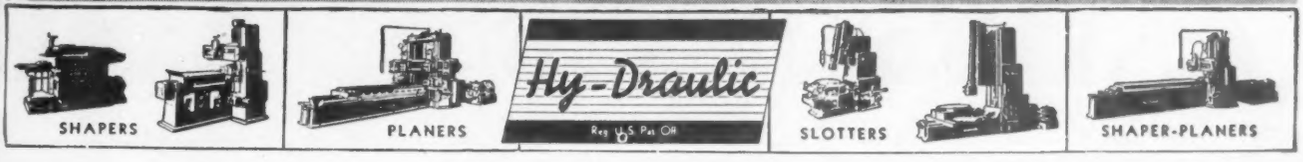
Rockford Hy-Draulic SHAPER PLANER

ROCKFORD MACHINE TOOL COMPANY

ROCKFORD ILLINOIS



Rockford Hy-Draulic DOUBLE HOUSING PLANER



Frank Di Benedetto,
blocker,
with J&L 12 years

John Morgan,
galvanizer,
with J&L 9 years

Wire galvanizing unit

FROM AN ORIGINAL DRAWING AND SKETCHES MADE AT J&L ALIQUIPPA WORKS BY ORISON MACPHERSON

STEEL WIRE
HELPS WEAVE PATTERN OF VICTORY

Steel rolled from ingots to blooms, blooms to billets, billets to rods, rods drawn to steel wire, runs a fiery trail as it is processed into one of its most useful forms to serve us in peace and war.

For steel wire enters into the making of so many thousands of articles of daily use that it stumps the experts to count them; plays such an important role in the waging of war that without its aid our armies would be severely handicapped, planes more often grounded, ships circumscribed.

Fortunately for America the steel industry has the raw materials, the coke ovens, the furnaces, the mills, the men, the skill to produce steel wire in vast quantity and in great diversity of sizes and kinds, and of a quality that serves us faithfully.

Knitting together much of the fabric of our civilization — steel wire now helps defend that civilization and waits only upon peace to further enrich it.

JONES & LAUGHLIN STEEL CORPORATION

J&L STEEL

PITTSBURGH, PENNSYLVANIA

CONTROLLED QUALITY STEEL FOR WAR AND PEACE

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WIRE FOR WAR

Like a giant loom is the final process in galvanizing steel wire (see illustration) when all the strands come through the zinc bath and are spun bright and strong on the spools.

"Ferritic" welding rod wire, used in welding cast and rolled armor, is a development of the National Research Council in cooperation with J&L metallurgical research and production. Welding results obtainable with this special, high-manganese, ferritic weld rod wire, indicate it will have wide use in welding of many peace-time products.

"Concertina" barbed wire is a new steel product used by the army for entanglements. Produced in the form of a tough, gigantic spring with 4-point barbs every 3 inches on single strand (not two twisted wires) it will stop armored vehicles as well as infantry.

Signal Corps wire, produced by J&L and other steel manufacturers, is a fine galvanized wire with diameter of only 13/1000 of an inch. Four strands of it are wound with 3 strands of copper wire, then covered with insulation and used for battle front telephone and telegraph lines. Copper wire carries message. Steel wire supplies the strength.

330,000 miles of signal wire were strung by American troops in Western Europe alone during first five months after D day. Each month 90,000 additional miles of wire must be supplied Signal Corps in same area.

Recording sound on steel wire has been widely adopted for the war, will have many applications afterward. Small diameter, medium or high carbon steel wire is used to pick up battlefield sounds, accounts of combat operations, reports from reconnaissance pilots. Wire can be "played" many thousands of times without sound distortion.

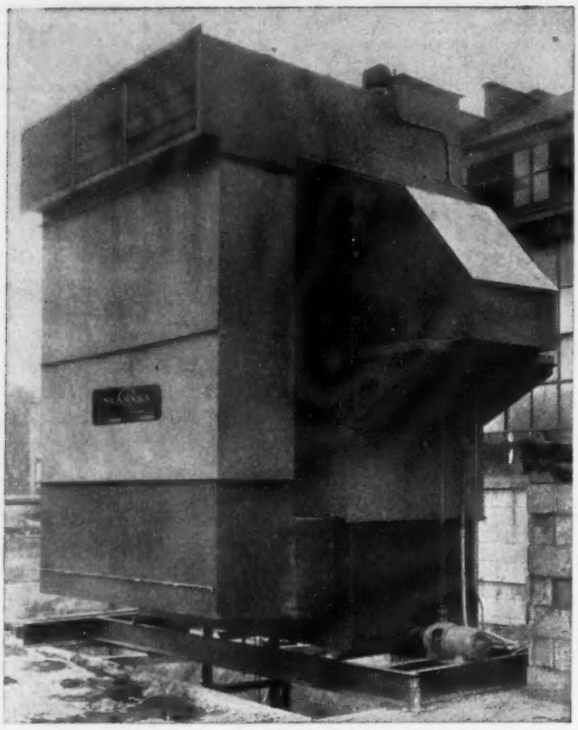
Woven wire fabric for cots in Army, Navy, Marine and Seabee camps, hospitals, hospital ships, and elsewhere, is made of bright, clean, resilient steel wire, such as J&L Mastercraft, which is also used in coiled steel springs for upholstered furniture.

Barbed wire, guns, rails, windmills, all of steel, made possible swift development of the Great Plains into America's vast supply source of meat, bread and other foodstuffs. Steel repeating firearms made land safe for settlers. Steel rails gave the boundless region easy access to markets. Wells, drilled with steel bits and cable, pumped by steel windmills, furnished water for irrigation and livestock. Finally, barbed wire—thousands of miles of it in this timberless land—enabled segregation of cattle from crops, and the West boomed into prosperity.

Ten-penny nails, six-penny, four-penny, three-penny nails today denote sizes of nails. Long years ago these terms indicated the prices, as nails were sold in England at so many pence per hundred nails by size.

"BALANCED WET BULB" TEMPERATURE CONTROL

U. S. Patent Re-issue No. 22,533



Don't PURCHASE COOLING WATER!

● Whenever a process calls for the use of water to cool liquids or gases, investigate using the NIAGARA Aero HEAT EXCHANGER to gain these benefits:

1. Year 'round operation at full efficiency.
2. Reliable temperature control within 2°F.
3. Elimination of water treatment.
4. Saving 95% of water consumption.
5. Avoiding risk of shutdown in time of water shortage.
6. Saving piping, pumping and power and equipment costs.

The NIAGARA Aero HEAT EXCHANGER, using outdoor air as the cooling medium with the evaporative method, removes 1,000 B. T. U. from a liquid for each pound of water evaporated. Accurate temperature control within 2°F. is assured by the Niagara patented "Balanced Wet Bulb" control which always provides the correct admixture of fresh and recirculated air. Hundreds of industrial plants, operating a wide variety of processes, have found it the most reliable, most compact and economical apparatus for liquid cooling. Write for Bulletin 96.

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INDUSTRIAL COOLING HEATING • DRYING

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HUMIDIFYING • AIR ENGINEERING EQUIPMENT

Electronic Flame Cutter

(*Concluded from Page* 104)

in extreme heat and extreme cold, in outdoor as well as indoor operation. During the period of development and refinement of the basic idea, particular emphasis was laid on reducing the operation of the machine to the simplest possible routine and this, he says, has been achieved. The burner who regularly operates other standard machines can operate the ISC machines.

Construction Features: The major interest of Struthers Wells Corp. naturally centered on construction of chassis, housing, torch arms, running gear, etc. The chassis of the electronic flame cutter is of steel, rigid enough to free it from whip. There are no movable connections to be affected by vibration and wear, with subsequent roughness and distortion of the cut. Machine is mounted on ball bearing rollers and runs on heavy T-shaped rails. The rack gear drives the machine in either direction along the rails, thereby eliminating wear on the latter. Proper alignment of the one rail to which rack is attached is sufficient to maintain accuracy in operation. A special trailer installation has been designed and can be made available for carrying gas bottles as an alternate method of operation where piping of gas to machine cannot be arranged conveniently.

Phosphorous Pentoxide Glass Resists Hydrofluoric Acid

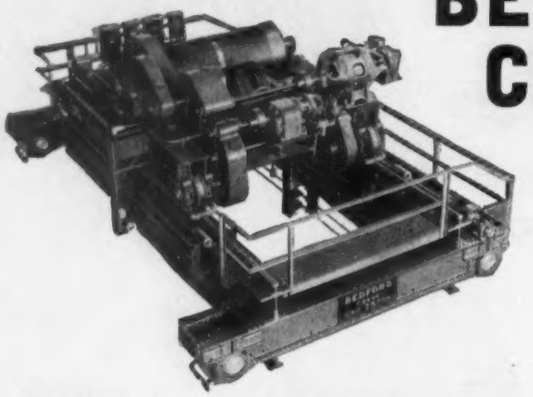
A glass based on phosphorous pentoxide instead of silica has been developed by American Optical Co., Southbridge, Mass., to resist hydrofluoric acid. Fluoride-resistant glass is suggested for use in sight glasses, gages, laboratory ware, protective screens, and goggles which might contact either dry hydrogen fluoride gas or its aqueous solutions. Larger-scale potential uses include windows and fume hoods in chemical plants. Although the glass is slowly attacked, it is said to retain its transparency throughout the attack, whereas silicate glass becomes opaque by frosting and is dissolved more rapidly by hydrofluoric acid. This glass can be fabricated by the usual methods of casting, cutting, molding, grinding and polishing, and can be blown into many forms of laboratory ware.

—o—

A 4-page illustrated folder describing aircraft heaters providing from 15,000 to 100,000 British thermal units per hour and automotive type heaters providing from 15,000 to 40,000 British thermal units per hour is available from Fluid Heat Division, Anchor Post Fence Co., Baltimore 24, Md. Folder SH-2 shows cutaway views of the heaters and gives specifications of all models. It also explains the combustion process known as vapor entraining developed by the company's engineers.

WHERE THERE'S TOUGH WEAR
THIS IS THE RACO WAY—
RACOLLOY MANGANESE
AUSTENITIC MANGANESE STEEL ELECTRODES
RACOLLOY Manganese heavily coated steel electrodes are used for repairing broken or worn austenitic 14% manganese steel parts and for applying deposits of manganese on mild steel.
The deposits are equal in toughness, wear-resistance and work hardening capacity to cast or wrought manganese steel. Moreover, since these electrodes contain nickel to prevent brittleness, the deposits withstand severe shock.
Among the applications for RACOLLOY Manganese are rock crusher jaws, pumps, dredge buckets, railway frogs and similar spots subject to rough treatment.
OTHER RACO HARD SURFACING ELECTRODES:
RACO 25—Heavily coated; for building up worn parts and surfaces on which a tough machinable deposit of moderate hardness is needed.
RACO 45—Heavily coated; for surfaces that require no machining, but must withstand severe wear and abrasion.
RACO 55—Heavily coated; for building up surface of extreme hardness and wear-resistance.
★
These electrodes are identical with all RACO products—precision made and of best materials to give finest performance.
The REID-AVERY COMPANY
INCORPORATED
DUNDALK • BALTIMORE 22 • MARYLAND
SINCE 1919 PRODUCERS OF ARC WELDING ELECTRODES AND WELDING RODS

Crane Builders Since 1903



BEDFORD CRANES

Capacities:

5 to 150 TONS

ANY SPAN OR LIFT

Designed and Engineered to meet Your Requirements

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ELECTRIC OVERHEAD TRAVELING CRANES
GANTRY CRANES • STEEL DERRICKS
BUILT TO YOUR SPECIFICATIONS
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AIRPLANE HANGARS

Engineers
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BEDFORD FOUNDRY & MACHINE CO.
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Gray Iron Castings

"As WE make it"
—so shall you sleep—to awaken refreshed for a busy day in industrial Detroit. Those coveted inner-springs (out for the duration) are still with us!
DETROIT-LELAND HOTEL
SINGLE FROM $2.50
Charles H. Loh, General Manager

Quality Control

(*Concluded from Page* 105)

tioned before, variables control charts should not be replaced by this type of chart. The best use of the charts shown here is in a situtation where some attributes gages are in use and cannot be replaced easily with variable measurement. The information obtainable from these charts is shown in the examples A and B. Where three divisions are used, the trend of tool wear easily is observed as the hourly samples change gradually from minus R to S to M to L and to plus R. However, if only two divisions (L and S) are used, the changes naturally seem more sudden. When using these charts, it is possible to control quality much better than with go-no-go gages used in the usual manner.

These charts have been found helpful in the manufacture of complicated parts in which certain dimensions are easily measured by means of a dial gage or micrometer, while others can be inspected on a production basis with special gages only. It was on gages such as this that some of the advantages of variables inspection were obtained from attributes gages. The trial has been very satisfactory.

Although very little scrap was being made, a considerable amount of reworking formerly was necessary. The machinists, not knowing exactly where they stood regarding the tolerances (only go-no-go information), were inclined to aim for the high side of the tolerance. If they then made an error, they merely reworked the part. Patrol inspection plus control charts now have reduced rework from 10 per cent to less than 1 per cent.

Manual Discusses Design, Uses for Broaches

A book entitled "Manual of Broaching," printed in two colors and containing 88 pages of information, is available from Detroit Broach Co., 20201 Sherwood, Detroit 12, at $1.50 per copy. Supplementing the text are 96 photographs and 54 drawings. Book covers design and usage of all types of internal broaches, face plates and broach pullers; a general discussion of surface broaching principles, with many examples and including a section devoted to fixtures, broach holders, and inserts; a review of all types of broaching machines, outlining various uses and advantages for particular types of work; and a section devoted to operation and maintenance of broaching equipment, including broach sharpening.

—o—

A bulletin, form 766, describing and illustrating simplified private automatic exchange telephone systems, is available from Kellogg Switchboard and Supply Co., Chicago. These PAX intercommunication systems feature simple construction and operation, small size, compact design, and easy maintenance.

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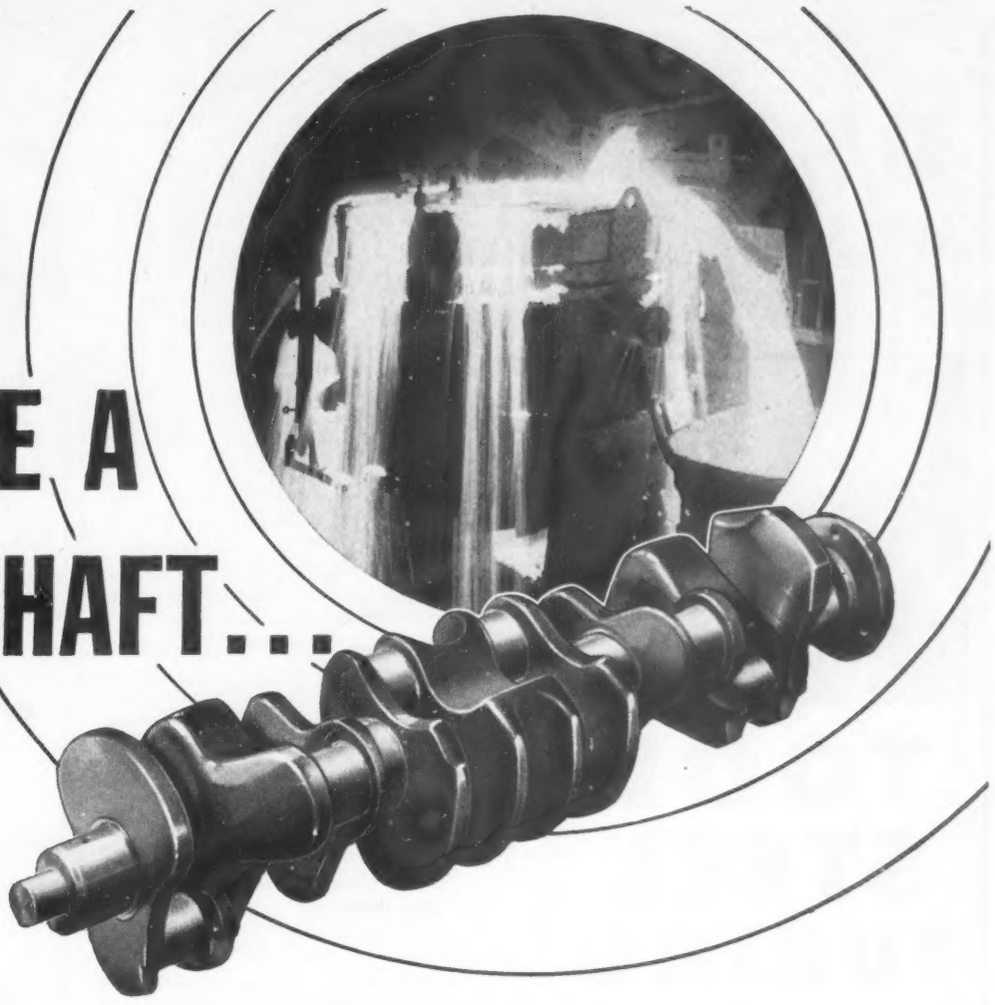

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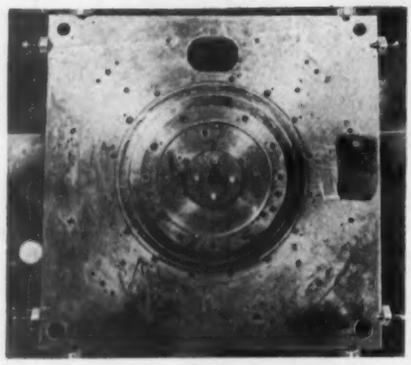

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Fractography

(*Continued from Page* 109)

with all its structures crystallographically disposed.

2. Completely undisturbed by buffing and etching, these facets therefore disclose the true interior of the grain. As for the advantages of etching, a subsequent treatment generally is no more difficult than with a polished specimen.

3. Structures revealed often are new to the science and cannot be studied with conventional polish-and-etch technique; furthermore, new information may be gained from known structures by observing them under these new conditions.

4. The plane of weakness, which often is the plane of greatest importance in studying the service and failure of metals, becomes the plane of observation. Opportunities for studying causes of the weakness therefore may be much greater than when using a random section.

5. Finally, there may be general advantages, which include the following:

(a) Time-saving by avoiding mounting, polishing and etching.

(b) Applicability of odd sizes and shapes and tiny fragments unsuited to conventional examination.

It must be clearly understood that these advantages represent optimum conditions and are rather heavily balanced against disadvantages which will never allow the method to be used as more than a supplementary metallographical tool. It especially implements the study of defective material, since large facets of brittle failures favor this type of examination. Ductile material and fibrous fractures often make examination exceedingly difficult. Fractography is the name we have applied to this technique.

Preparation of Specimens: The experimental technique is very simple, requiring only three accomplishments: (1) Obtaining a brittle fracture; (2) orienting a facet with the axis of the microscope; and (3) obtaining the close approach of the lens to the specimen required for high magnification.

Because each cleavage facet constitutes a specimen, the metal should be made to break in such a manner that an individual facet covers most of the microscopic field at the magnification desired. Brittle metals generally conform to this without pretreatment, except for some which cleave irregularly or conchoidally (with shell-shaped depressions and elevations). For normally ductile metals, sufficient brittleness often can be conferred by rapid fracture (as by impact), fracture at subnormal temperatures, by embrittlement with cathodic hydrogen, or by such means as hydrostatic rupture. Any fractured face usually will serve, whether it is that of a standard tensile specimen, a failed article, or a mere chip from a sample.

Next, the problem is to orient one of the individual cleavage facets perpendicular to the axis of the microscope. Pre-

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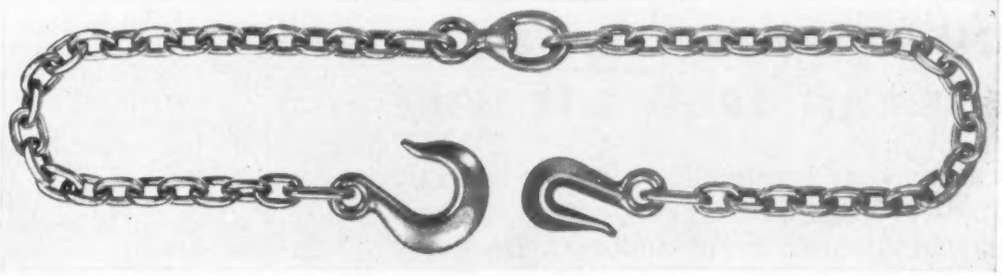

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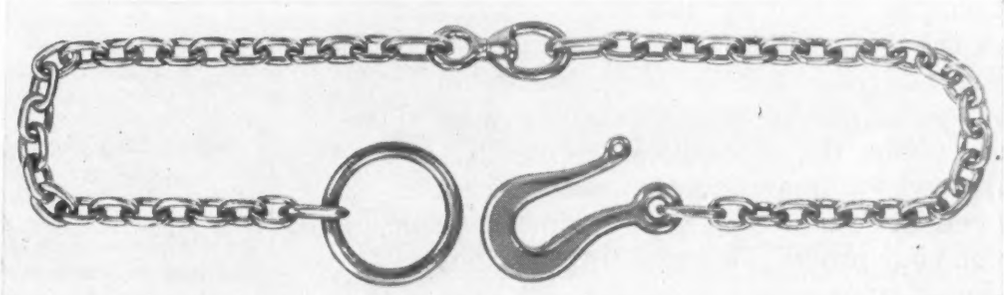

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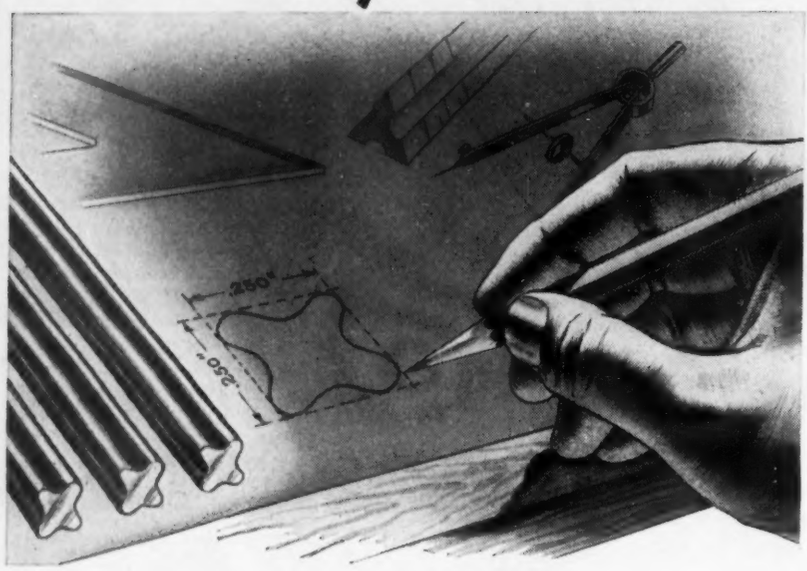

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liminary low-power examination with binoculars will aid in selecting the best facet. To accomplish the orienting, the simple orienting mechanism shown in Fig. 1 is used. This consists of a base plate, which fits into the annular opening in the stage of the microscope, and a superposed specimen holder supported by three screws whose bases are countersunk slightly into the baseplate. The latter may be threaded to fit the stage, or three bits of plasticene may be used at roughly 120-degree positions beneath the baseplate to give the structure steadiness. The specimen is held from above by any suitable means, such as clamps, bakelite or plasticene in the central holder, with the facets of the specimen approximately horizontal. Starting with a low-power objective, a facet is brought into approximate horizontality by means of the three leveling screws. With practice, manipulation of leveling screws becomes much easier.

An electric hand-grinder of the type in Fig. 1 is a simple answer to meeting the problem of surface irregularities. Working the tool while observing the specimen under binoculars, one can perform operations on interfering promontories sufficiently delicate to allow the use of a contact objective on almost any specimen. A variety of tips can be obtained for this tool to allow grinding, drilling, or buffing, the latter being used for applying a polish-etch technique to individual cleavage structures. A long-nosed objective lens is especially suited to this type of work.

Appearance of Grains and Grain Boundaries: In contrast to the appearance of a grain boundary in most polished and etched specimens as a narrow depression on a flat face, grain boundaries of fractographic specimens appear as shown in Figs. 2 and 3. The change in cleavage direction, because of the different orientation of contiguous grains, gives a ridge-like effect, the secondary grain being in shadow and generally proceeding out of focus away from the boundary of the focussed facet.

In this case, the specimen is a low-silicon (1.59 per cent silicon) ferrite (See accompanying table). Note cleavage facet intersected by visibly crystallographic planes, along with their natural markings of less regular characteristics whose nature remains to be explained. Inasmuch as this alloy is known to cleave on [100] planes, and as these intersecting markings obviously are cleavages because they bound fragmented and removed material, it may be assumed the markings also follow [100] planes.

The only visible planar angle in the low-silicon ferrite (Fig. 2) is 90 degrees. If these markings represent planes other than [100]—such as [110], [112], or [123] slip markings, or [112] Neumann bands, which also can show 90-degree registrations on a 100 cleavage, interesting instances of cleavage occurring on slip or twinning planes would be represented. Furthermore, the same specimen, subsequently deep etched (Fig. 2), proves that these crystallographic markings are

either real discontinuities or narrow zones of disorganized or reoriented material in the atomic structure.

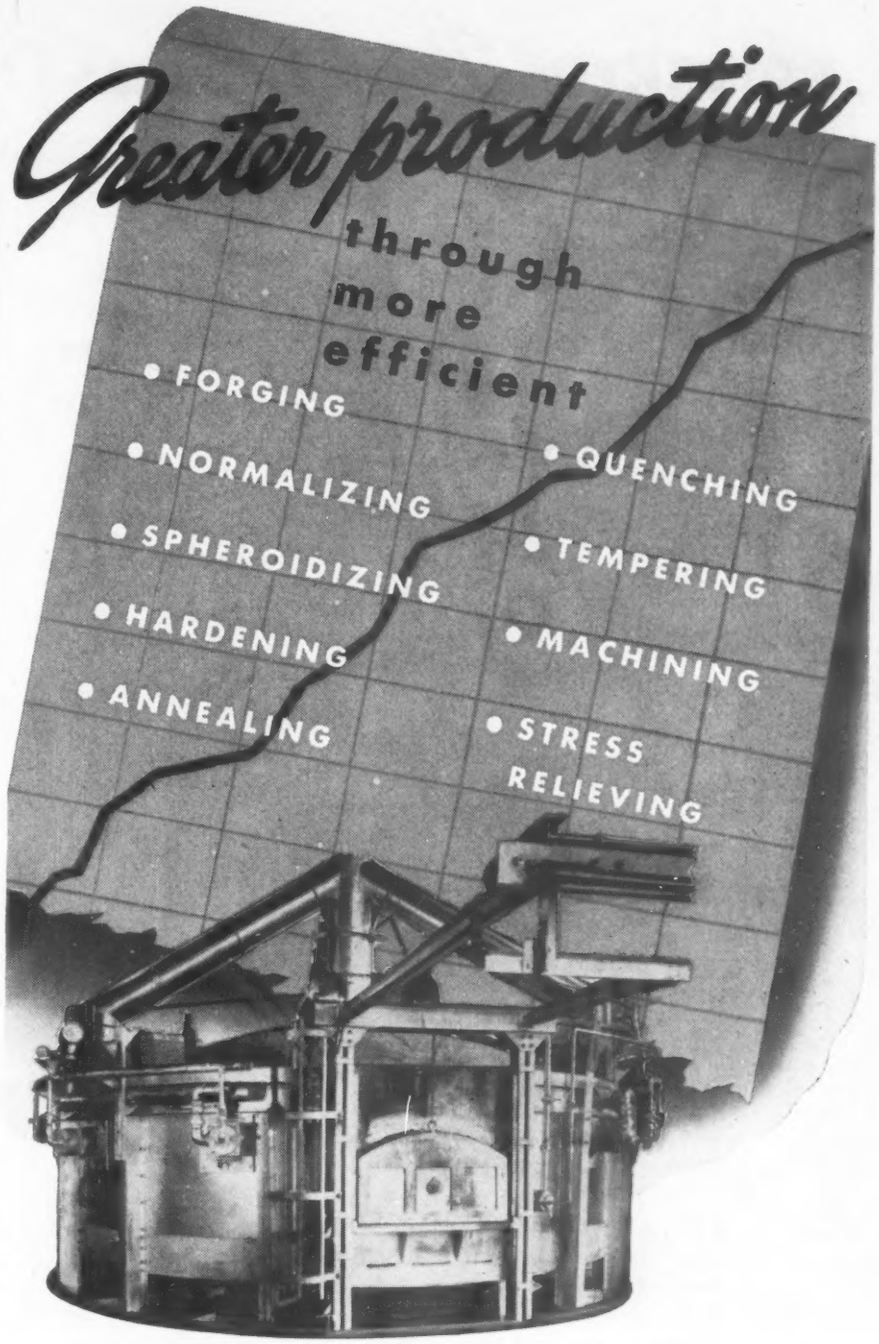
Metallic and Nonmetallic Structures: Although metals are distinguished by their unique deformability, when fractured in a brittle manner, they often show informative similarities with nonmetallic crystals. Thus, ingot iron (Fig. 5) shows well developed crystallographic markings on its fracture not unlike those shown by common salt (Fig. 6). Note passage of markings through what appears to be a grain, or lineage, boundary of the ingot iron.

In rock salt the similar crystallographic markings may be part of the rather well known imperfection structure of the NaCl lattice[9], a structure much argued for metals. Theoretically, NaCl should show a tensile strength of 285,000 psi; actually, it shows a strength of only 5700 psi, apparently because the lattice is not continuous. By suppressing the weakening effect of these discontinuities, strength of rock salt has been increased from 5700 psi to nearly 225,000 psi[10]. As metals similarly show an actual tensile strength of only 1 per cent or so of the theoretical, any possible analogy with the deformation of salt crystals obviously provides fascinating speculation.

In Fig. 7 a much more complicated substructure shows itself. A 4.24 per cent silicon ferrite (See table) fractured in the as-cast condition, revealed this intricate combination of fernlike, or lineage, network bounded and subdivided by a crystallographic cell-like structure, all within one grain. Detail of the lineage structure largely escapes resolution at this magnification, but close examination reveals an elaborate structure the more remarkable because of its small size. Fragmentation in the lower right leads to designating principal rectangular markings as [100] cleavages. Note that large markings appear slightly depressed; also note single contraposed marking (vertical line to right center) at 45 degrees to major markings. This cannot represent cleavage, which occurs on [100] planes for this material. Slip, occurring here on [110] planes, could have a 45-degree trace, as could twinning on [112]. In comparison, a photomicrograph of rock salt in Fig. 8 shows a possibly similar pattern, especially with respect to the effect of relief about the geometric markings.

Determining Constitution by Fractography: Phases usually can be recognized as conveniently on a fractograph as on a polished and etched specimen, for the fracture type of a phase is as distinctive as its etch type. For example, in Fig. 9 a small chip of 75 per cent ferrosilicon observed fractographically immediately reveals its two phases without further treatment. Bright portion of the flat dendritic pattern is Fe_2Si_5 and may be recognized as such wherever it occurs. The iron-saturated silicon, or theta phase, is friable and difficult to handle and comprises the dark unresolved background.

Etching techniques may be used. Fig. 10 shows an ordinary polished-etched specimen of 18.10 per cent ferrosilicon,



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revealing two phases which apparently are FeSi and either alpha iron containing silicon, or Fe_2Si[12]. A chip was heated briefly in an electric furnace at 1800 degrees Fahr. Its heat-tinted fractograph, shown in Fig. 11, reveals two phases immediately. In the fractograph they can be distinguished from one another, the lighter being higher in silicon.

In Figs. 12 and 13, acid etching is compared for a polished specimen and a fractured specimen. In the fractured specimen one phase has dissolved away, leaving the dendritic branch of the less soluble primary phase plainly visible.

New Structures—More About Known Structures: A principal use of fractography probably will develop through expanding our information about known structures, as a simple, well established microconstituent may show an astonishing assortment of new structures on a fracture. For example, in Figs. 14 and 15 a customary photomicrograph of Type 405 stainless steel (See table) is compared with its fractograph. This specimen had been overheated during hot rolling and large brittle crystals had formed in a somewhat decarburized surface layer. Its condition made it ideal for fractographic examination, and the photographs were taken in this surface zone. While the polished and etched field is typical and simple enough for easy readability the fractograph contains a mass of large and small-scale detail requiring much work to explain it all. Obvious lineage growths and block formation, all within a single grain, are but part of the story contained in Fig. 15.

Figs. 16 and 17 are a similar pair of photomicrograph and fractograph for Type 446 27-Cr steel. Specimen was annealed for 40 hours at 1600 degrees Fahr. and water quenched to develop large grains and brittleness making it especially suitable for fractographic examination. Again, the polished and etched field is typically plain; whereas the fracture is a mass of detail. Much definition is lost in a reproduction, but under the microscope one sees tiny dendritic units, shown in the illustration as small white markings. All changes in elevation appear to progress in discrete steps, or levels, which uniformly measure some fraction of a micron in thickness. Carbide particles, though probably not visible in the reproduction, can easily be seen in the microscope. The grain size also is estimable, as the grain boundary ends the flatness of a field.

The fractograph conveys most of the information contained in a polished sample, and in addition displays an incredible amount of detail remaining to be cataloged. As a further illustration of the prolific detail contained in some fractographs, as compared to the polished and etched specimen, an 11.84 per cent ferrosilicon (See table) is depicted in Figs. 18, 19, 20, 21, and 22. Much argument has centered upon alloys of approximately this composition, and most investigators agree that they lie within the alpha solid solution range of the binary diagram; yet anomalies in their behavior are consistent-

ly reported which would indicate that they are not a simple solid solution.

Fig. 18 snows a customary polished specimen of cast 11.84 per cent ferrosilicon etched with 25 per cent HNO_3. The microstructure is somewhat unusual because of the network of sub-boundary markings. Nevertheless, polishing and etching here reveals nothing but a single phase.

Fractographs, on the other hand, reveal a multiplicity of structures, which is not particularly consistent with what might be expected of a homogeneous solid solution, and which suggests some internal rearrangement characterizing this alloy. Four different fields selected throughout the casting are shown in Figs. 19, 20, 21, and 22. The structure shown in the fractograph, Fig. 19, possibly resulted from a fracture parallel to the axis of a dendrite, which might account for the undulatory markings; or this pattern might be related to the markings on the specimens in Fig. 7.

In the fractograph, Fig. 20, taken at 2000 diameters, a good view is obtained of the stepwise, or lamellar, nature of many fracture facets. Here there seems to be a basic structural pattern of pearlite in a metal which shows no pearlite. Etching only obliterates the structure. Since the dimensions of pearlite lamellae are nearly identical with the dimensions of this structure, one might speculate that the lamellar nature of pearlite, which has intrigued metallurgists for years, is the result of an action taking place within a structure whose characteristics of lamellar or block imperfection predetermine the disposition of the ferrite and carbide.

In the fracture of Fig. 21 there appears a rib-like structure which is scarcely in keeping with the conception of a simple homogeneous phase. Of course, cast structures are not homogeneous. Nevertheless, a glance at the other alpha ferrosilicons in Figs. 3 and 7 shows their almost complete dissimilarity with fractures of the 11.84 per cent ferrosilicon specimens. The latter show radical departures which confirm opinions from other sources that some internal change, perhaps an ordering process, occurs in this portion of the alpha field[11].

The fourth and entirely different fractograph of the same alloy (See Fig. 22) displays a pattern not observed elsewhere. Based upon the same lamellar cleavage characteristics discussed previously, the pattern here reminds the observer of a sheaf of wheat. That pattern was not noticeable on etched specimens. As this structure has no apparent relationship to another phase, it well can be explained on the basis of granular strains or imperfections whose existence is revealed only by fractography.

As concluding examples of the new field for research afforded by such studies of cleavage facets at high magnification, Figs. 23 and 24 show other structures which resist explanation on classical grounds. The pattern in Fig. 23 is evidently a dendritic, or a growth pattern; yet, buffing this structure with a small wheel attached to the hand-grinder and then

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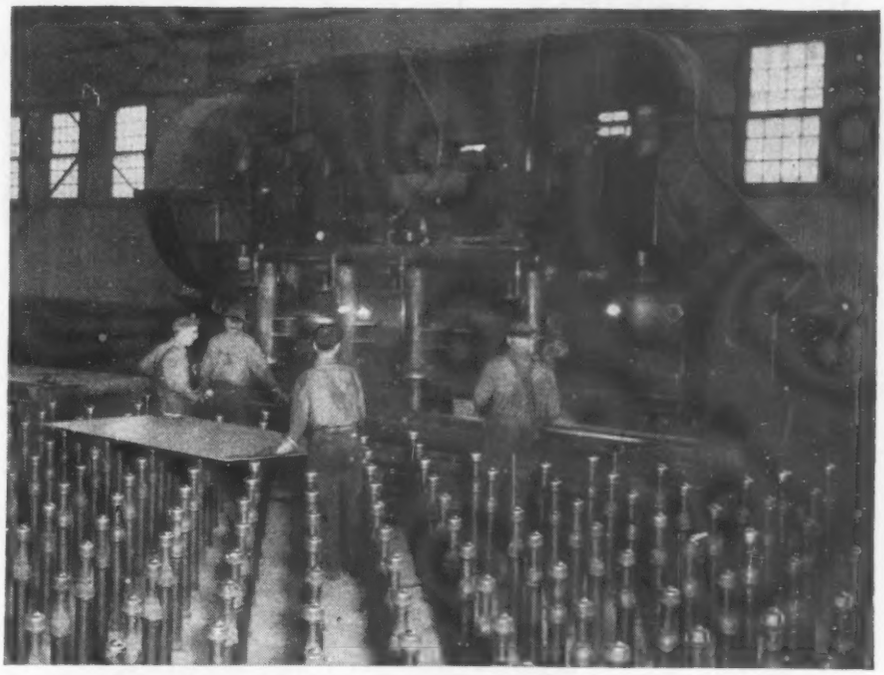

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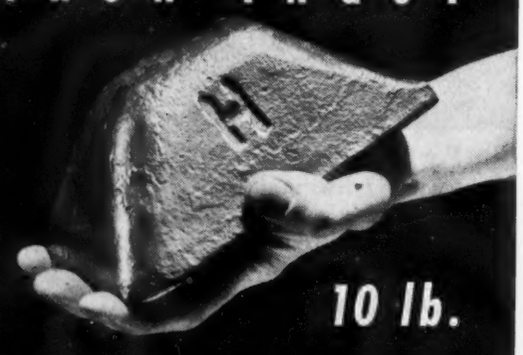

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etching the buffed surface with 20 per cent HNO_3—20 per cent HF, caused no reappearance of the pattern.

Such a cleavage pattern, existing as it does within a supposedly homogeneous phase, seems virtually certain evidence that this is a pattern of lattice imperfection. The classic interpretation that deformation and cleavage are subject only to the spacing and density of certain atomic planes definitely fails here. That is, the lamellar pattern in Fig. 20 still could be explained on classical grounds as a shift of cleavage from one set of planes to another parallel set because of some odd-angle direction of stress with respect to the cleavage direction; but the pattern in Fig. 23 will allow no such argument. Although cleavage in this ferrosilicon alloy undoubtedly follows classical cleavage planes, these planes in turn undoubtedly are separated by outright hiatuses which depict the pattern and represent sufficient weakness to influence and to deflect the path of cleavage as they do.

One might presume that the growth of the grain in this case was dendritic or lineage, developing periodic discontinuities too small to disrupt the overall crystallinity. This is in good agreement with the general understanding of imperfection structure in crystals, a conception that has been exceedingly slow in developing in view of the vast simplification it offers to many fundamental metallurgical problems.

A structure with a remarkable appearance is shown in Fig. 25. Found in cast 18.10 per cent ferrosilicon, several of these needle-like formations lie within the grain. Its closest resemblance is perhaps a martensite needle, although this alloy should contain no martensite. Note midrib declivity, the toothy markings, and the fainter parallel markings lying alongside. Also note magnification at 4200 diameters.

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Electric Furnace Capacity

(*Concluded from Page* 128)

ratio for capacities from 6 to 200 tons. These are mostly steel mill furnaces. Note the curves giving diameter of shell required to hold a given size bath. The curves correspond to various thicknesses of wall refractories with indicated amounts of backup material. To arrive at theoretical shell diameter, it is assumed that one-fourth of the wall brick are worn away as shown in Fig. 1.

Usually wall thickness is approximately two-thirds of bath depth, and bottom is approximately equal to bath depth. On larger furnaces the amount of refractories is usually less than these ratios, while on smaller ones it is usually more. Wall thicknesses should correspond to standard brick dimensions.

The following suggested wall thicknesses may be a helpful reference:

Bath capacity	Thickness of wall brick, inches
250 to 1000 lb	6
1000 to 4000 lb	9
4000 to 24,000 lb	13½
12 to 100 tons	18
100 to 200 tons	22½

With the foregoing data it is a simple procedure to calculate recommended maximum and minimum size heats for any furnace shell. It is also possible to determine the best shell size for a given capacity bath or charge.

This recommended furnace capacity should be interpreted in the same manner as maximum recommended load capacity for a truck or maximum recommended lifting capacity for a crane or hoist. It is entirely possible for an operator to overload his equipment beyond this recommended limit, but this overloading greatly increases maintenance costs and shortens life of the equipment.

Melting rate is independent of shell capacity and should not be confused with it.

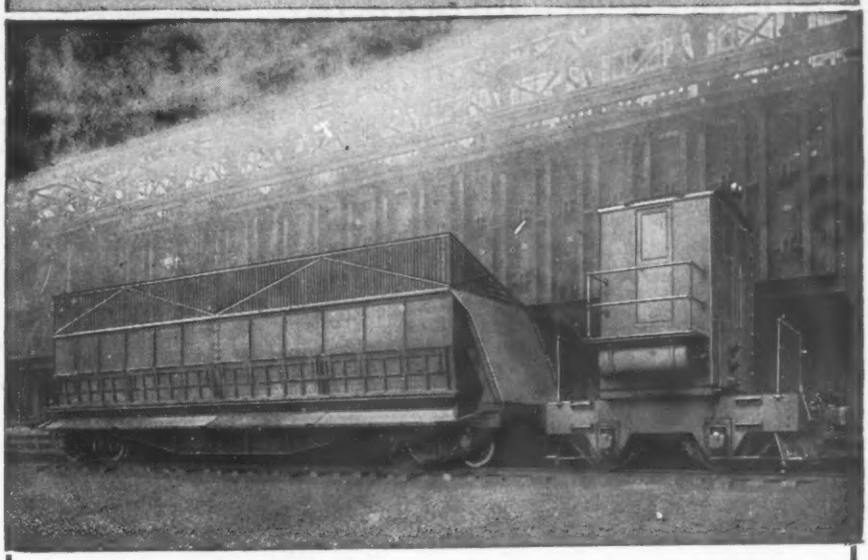
Rack Type Gear Finisher Described in Bulletin

A rack type gear finishing machine, Model 900, which operates on the cross-axis shaving principle, is described in a technical bulletin, No. 900-44, available from Michigan Tool Co., 7171 East McNichols, Detroit 12. It contains specifications for the machine, together with a list of standard and special items.

Machine is said to produce precision gears in mass production at low cost for any gear finishing process and will handle either spur or helical gears from 1 to 8 inches pitch diameter and up to 2 inches face width. It is used also for finishing involute splines and similar items.

Use of the basic rack for finishing gears is reported to assure minimum errors in concentricity, uniformity, spacing and tooth profiles. Normal or base pitch always is correct with this machine. Operation is so simple that unskilled and semiskilled help can be trained to operate it in a short time.

COKE OVEN EQUIPMENT



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All Atlas Coke Oven Equipment is of heavy-duty construction permitting the peak operating conditions required in today's stepped-up production schedules. As a result of years of experience, Atlas is able to design and build equipment, to meet the requirements of each particular coke plant. Detailed information available on request.

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THE BUSINESS TREND

Gradual Curtailment in War Output Expected

OVERALL production is tending downward despite the stepping up of operating schedules in a number of war materiel programs. Considerable fluctuation among the many industrial indicators is expected over the coming months reflecting the constant adjustments in war production schedules.

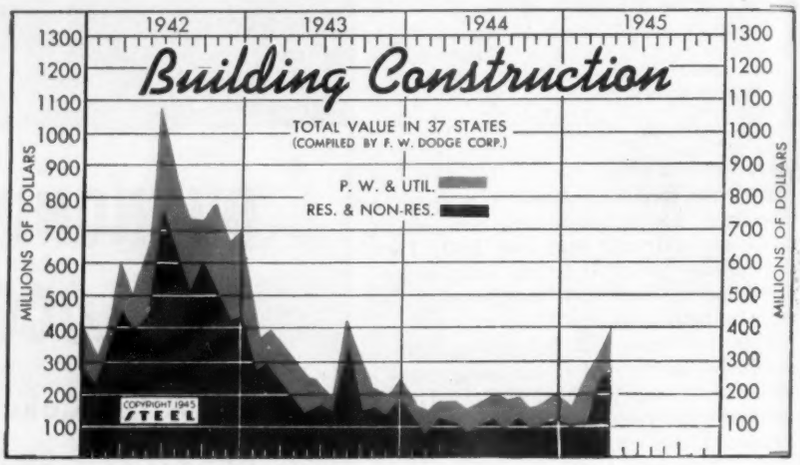
Total munitions output is scheduled to be gradually curtailed through the summer, with a substantial drop in war production indicated during the closing months this year. However, the raw material supply situation, notably steel sheets, is likely to be the biggest hurdle in the initial reconversion steps to civilian goods production.

Moderate declines were recorded in the following indicators during the latest period, bituminous coal output, freight carloadings and engineering construction awards. Steel ingot production recovered most of the ground lost in the previous week, following the settlement of the strike at Bethlehem Steel Co.'s Lackawanna works. There is a strong indication that steel production will remain at a high rate for some time, although full extent of the projected reduction in war steel requirements has not yet been determined.

CONSTRUCTION — Mounting evidence of postwar construction demand is indicated by the report of F. W. Dodge Corp., which states that 90,700 specific projects, estimated to cost $14.8 billion, are being contemplated for postwar execution in the 37 eastern states. This volume of postwar work is measurably greater than that contracted for any peacetime year. Any delays in postwar construction revival will be due to temporary material and manpower shortages. In view of this the War Production Board is proceeding very slowly in lifting building restrictions, although some of these regulations are expected to be withdrawn in the near future.

The three major tests facing the construction industry in the postwar period, according to F. W. Dodge Corp. officials, are: Whether the industry can get past the early revival period without a disastrous inflation of construction costs; whether its markets can be broadened by reducing costs; and thirdly whether the industry and those related influences which create construction demand can successfully control the boom.

RAILROADS—A joint WPB-ODT program for easing the tight transportation situation has begun with the allocation of 1,339,588 net tons of carbon steel for the country's transportation industry for third quarter. This steel allotment is the largest for any quarter this year, and amounts to 87 per cent of the steel requested by ODT, compared with a grant of about 70 per cent of the required steel for transportation needs this quarter.



Construction Valuation In 37 States

(Unit—$1,000,000)

	Total		Public Works-Utilities			Residential and Non-Residential		
	1945	1944	1945	1944	1943	1945	1944	1943
January	140.9	159 2	39.8	50.3	85.8	101.2	108.9	264.3
February	147.0	137.2	32.0	55.1	112.9	115.0	82.1	280.5
March	328.9	176.4	90.6	61.3	123.0	238.3	115.1	216.7
April	395.8	179.3	111.9	72.0	127.7	283.9	107.3	175.6
May	....	144.2	....	55.8	95.8	....	88.4	138.6
June	....	163 9	....	70.7	73.8	....	93 1	156.8
July	....	190.5	....	80.5	50.0	....	110.0	133.7
August	....	169.3	....	69.4	73.4	....	99.9	340.8
September	....	175.7	....	64.1	175.1	....	111.6	125.0
October	....	144.8	....	52.2	63.5	....	92.6	150.0
November	....	164.9	....	48 0	59.0	....	116 9	125.4
December	....	188.5	....	66.6	67.4	....	121.8	184.9
Total	....	1,993.9	....	746.0	1,106.9	....	1,247.2	2,106.4

FIGURES THIS WEEK

	Latest Period*	Prior Week	Month Ago	Year Ago
INDUSTRY				
Steel Ingot Output (per cent of capacity)	93.5	95.0	92.0	98.5
Electric Power Distributed (million kilowatt hours)	4,377	4,302	4,411	4,246
Bituminous Coal Production (daily av.—1000 tons)	1,777	1,803	1,717	2,042
Petroleum Production (daily av.—1000 bbls.)	4,867	4,860	4,798	4,513
Construction Volume (ENR—unit $1,000,000)	$29.0	$38.9	$22.2	$26.9
Automobile and Truck Output (Ward's—number units)	21,260	17,585	20,335	17,645
TRADE				
Freight Carloadings (unit—1000 cars)	845†	839	864	871
Business Failures (Dun & Bradstreet, number)	15	16	24	28
Money in Circulation (in millions of dollars)‡	$26,372	$26,312	$26,068	$21,846
Department Store Sales (change from like week a year ago)‡	+4%	+10%	−13%	+9%

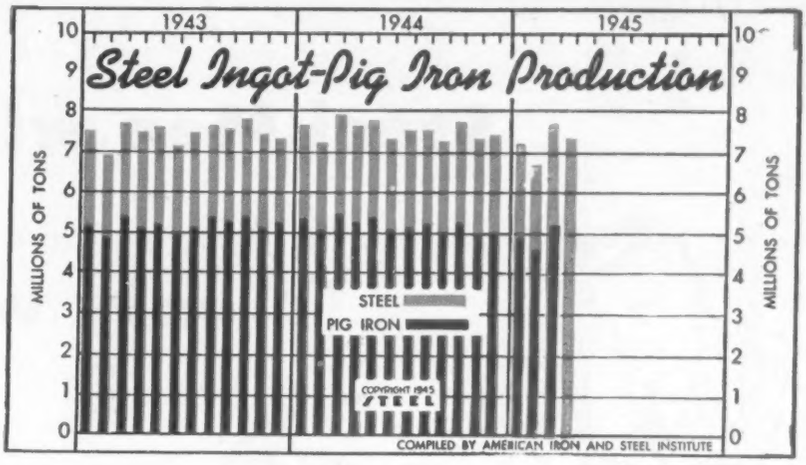
*Dates on request.

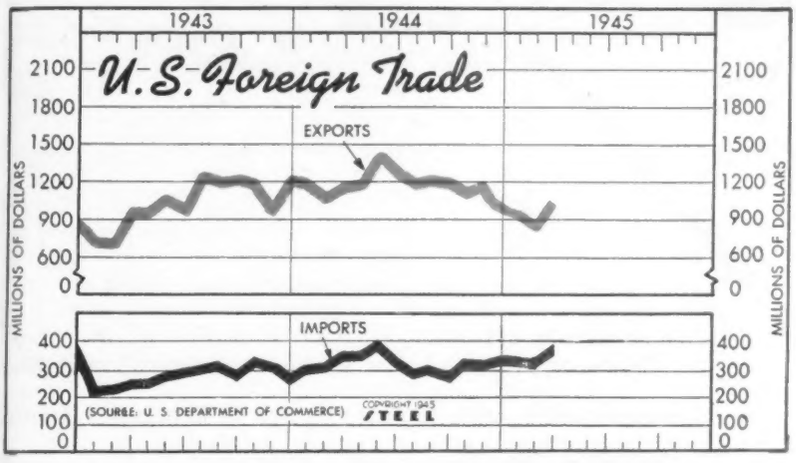
†Preliminary. ‡Federal Reserve Board.

Iron, Steel Production

(Net tons—000 omitted)

	Steel Ingots			Pig Iron	
	1945	1944	1943	1945	1944
Jan.	7,206	7,593	7,425	4,945	5,276
Feb.	6,635	7,194	6,825	4,563	5,083
Mar.	7,708	7,826	7,675	5,228	5,434
Apr.	7,309	7,594	7,374	....	5,243
May	....	7,703	7,550	....	5,343
June	....	7,234	7,039	....	5,057
July	....	7,498	7,408	....	5,157
Aug.	....	7,499	7,586	....	5,210
Sept.	....	7,235	7,514	....	4,988
Oct.	....	7,621	7,814	....	5,200
Nov.	....	7,279	7,374	....	4,904
Dec.	....	7,366	7,266	....	4,999
Total	....	89,642	88,873	....	61,894





Foreign Trade

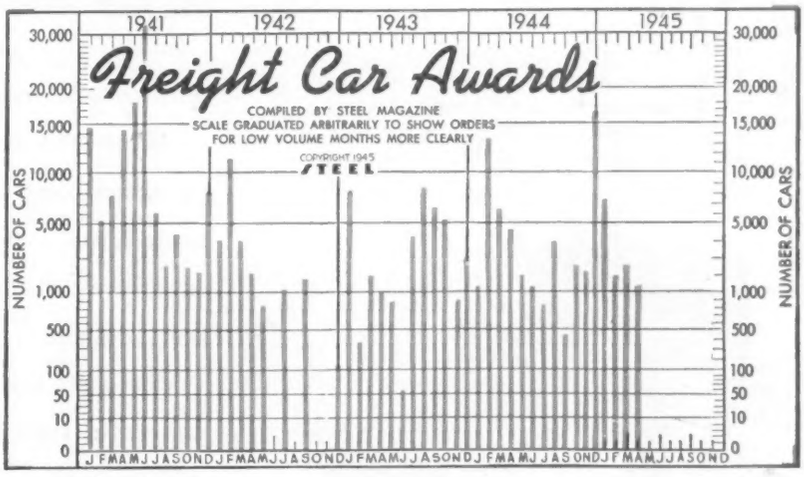
Bureau of Foreign and Domestic Commerce

(Unit Value—$1,000,000)

	Exports			Imports		
	1945	1944	1943	1945	1944	1943
Jan.	900	1,124	730	334	300	228
Feb.	882	1,086	719	324	313	234
Mar.	1,029	1,197	988	371	359	249
Apr.	....	1,182	980	...	359	258
May	....	1,419	1,085	...	386	281
June	....	1,271	1,002	...	330	295
July	....	1,198	1,262	...	293	300
Aug.	....	1,207	1,204	...	302	315
Sept.	....	1,199	1,235	...	280	285
Oct.	....	1,140	1,195	...	327	329
Nov.	....	1,184	1,074	...	322	317
Dec.	....	934	1,244	...	336	281
Total	...	14,102	12,716	...	3,907	3,369

Freight Car Awards

	1945	1944	1943	1942
Jan.	7,200	1,020	8,365	4,253
Feb.	1,750	13,240	350	11,725
March	2,500	6,510	1,935	4,080
April	1,120	4,519	1,000	2,125
May	....	1,952	870	822
June	....	1,150	50	0
July	....	795	4,190	1,025
Aug.	....	3,900	8,747	0
Sept.	....	400	6,820	1,863
Oct.	....	2,425	5,258	0
Nov.	....	1,065	870	0
Dec.	....	16,245	2,919	135
Total	....	53,221	41,355	26,028


1941
1942
1943
1944
1945
Freight Car Awards
COMPILED BY STEEL MAGAZINE
SCALE GRADUATED ARBITRARILY TO SHOW ORDERS FOR LOW VOLUME MONTHS MORE CLEARLY
COPYRIGHT 1945 STEEL
NUMBER OF CARS
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D

FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$11,025	$10,591	$10,191	$9,265
Federal Gross Debt (billions)	$237.3	$236.6	$235.5	$187.4
Bond Volume, NYSE (millions)	$52.2	$69.9	$69.5	$50.5
Stocks Sales, NYSE (thousands)	6,724	8,159	9,684	3,786
Loans and Investments (billions)†	$57.0	$57.2	$57.4	$50.6
United States Gov't. Obligations Held (millions)†	$42,748	$42,844	$43,327	$37,635

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$57.55	$57.55	$57.55	$56.73
All Commodities†	105.7	105.7	105.5	103.6
Industrial Raw Materials†	117.9	117.8	117.3	112.8
Manufactured Products†	102.0	102.0	102.0	101.0

†Bureau of Labor's Index, 1926 = 100.

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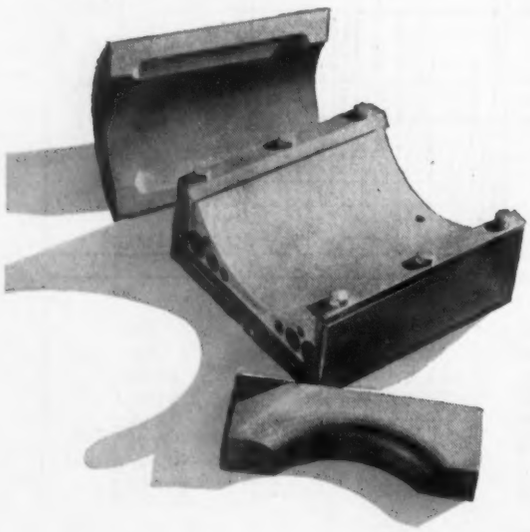


We've talked to a lot of steel men about roll neck bearings—worked with them for years to produce a bearing that gives them exactly what they want.

Today, over 3,000 stands of rolls are proving the value of Micarta Roll Neck Bearings, in the toughest kind of service.

Micarta Roll Neck Bearings last 10 to 15 times longer—cut power costs 20 to 25%—save time . . . through fewer screw-downs and less need for test bars. These bearings cut grease costs down to nothing . . . because water is their best lubricant . . . and they protect roll necks against scoring.

Most steel men know that Micarta Roll Neck Bearings are one of their best aids to uniform, economical rolling mill production.

The Micarta Data Book gives full details. Write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

J-06382

WESTINGHOUSE

Micarta

THE INDUSTRIAL PLASTIC

Small Price Relief Given; Production Holds Level

Industry finds allowance inadequate . . . Warehouses must absorb most of advance . . . Cancellations still light . . . Sheet, bar, wire demand heavy

MOST important development of the week has been announcement of increases of $2 to $7 per ton on several finished steel products, effective May 23, which include the interim advances granted in January,

Much disappointment has been expressed at the small advance, which the industry feels does not nearly compensate for higher labor and other costs which have developed since prices were frozen. Warehouses are forbidden to pass on the increased prices to customers except on a few products and the interim advances formerly allowed have been withdrawn. This action is attributed to alleged failure of distributors to furnish OPA with requested cost information.

Steel backlogs are shrinking slowly as cancellations still are relatively light and decline in orders generally is moderate. This leaves deliveries in sheets, bars, some types of tubular goods and wire still greatly extended. A notable exception is in plates, with backlogs dwindling and tonnage being offered for July and August. Plate shipments have been tapering since March, when well over 800,000 tons were moved for the highest total for the year, compared with the all-time total of 1,200,000 tons in March, 1944. Shipments in this quarter are expected to average close to 670,000 tons per month. Third quarter is expected to bring a heavy drop in Maritime Commission tonnage, from about 660,000 tons in the current quarter to 100,000 tons, according to current forecasts.

While cancellations since V-E Day have been light, developments are being watched closely, pending appraisal of what will be required in the Pacific war and what can be salvaged from military supplies in Europe. In some quarters it is believed the next 30 days will see many more cancellations than experienced so far. In spite of this no drastic cut in steel production is foreseen and many expect the low point to be reached this summer, with the decline cushioned by stocking of ingots of analyses known to be required later for civilian work. Even without this, no pronounced decline is expected for the summer in view of estimated needs of claimant agencies. With the Controlled Materials plan scheduled to end Dec. 31 no additional CMP allotments will be issued for fourth and subsequent quarters except under unusual circumstances, although authorizations already issued for these periods will stand.

Steelworks operations last week were steady at 93½ per cent of capacity, changes from the prior week being slight except for Buffalo, where resumption after a strike regained most of the loss. Chicago rose 1 point to 98½ per cent, New England 2 points to 92, Wheeling ½-point to 92½, Cleveland 1½ points to 94 and Buffalo 23½ points to 83½ per cent. Cincinnati declined 8 points to 84, Youngstown 1 point to 89, St. Louis 5 points to 75, eastern Pennsylvania 1 point to 92 and Birmingham 5 points to 90. Rates were unchanged as follows: Pittsburgh 92 and Detroit 88.

Heralding pentup demand for structural steel, awaiting loosening of restrictions, is placing of firm contracts by the Metropolitan Insurance Co. for three housing projects in New York City, requiring 64,000 tons of structurals, considerable tonnage of reinforcing steel and steel window frames. One contracting firm has the entire work and steel has been placed with three producers. Several months, perhaps two years, will be required for completion of the projects. Prices for the fabricated steel are said to be below current levels.

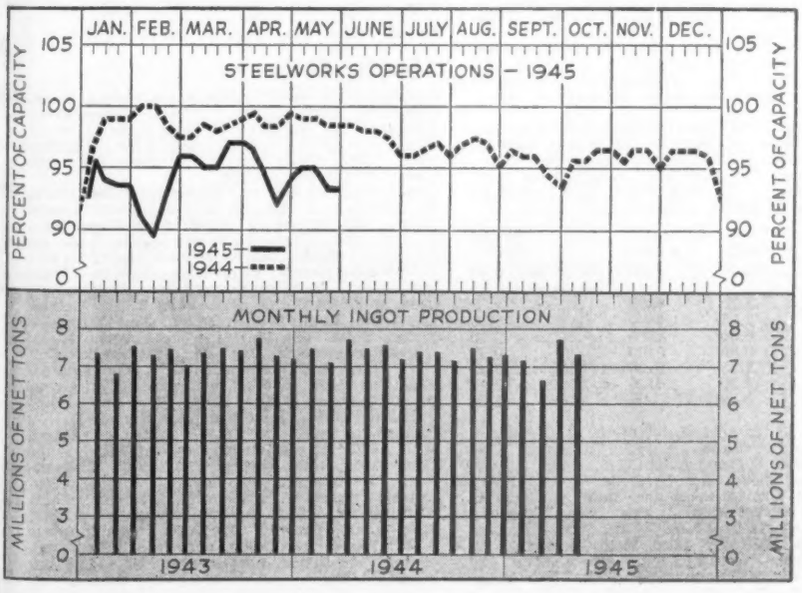
Reflecting higher prices allowed by Office of Price Administration, average composite prices of finished and semifinished steel are higher, finished steel composite rising from $57.55 to $58.27 and semifinished composite from $36 to $37.80. Due to a decline in eastern Pennsylvania the steelmaking scrap composite has dropped from $19.17 to $19. Steelmaking pig iron composite holds at $24.05.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended May 26	Change	Same Week 1944	Same Week 1943
Pittsburgh	92	None	93	99
Chicago	98.5	+1	101.5	97
Eastern Pa.	92	—1	94	95
Youngstown	89	—1	96	97
Wheeling	92.5	+0.5	102	93
Cleveland	94	+1.5	93	96
Buffalo	83.5	+23.5	90.5	93
Birmingham	90	— 5	90	90
New England	92	+ 2	90	90
Cincinnati	84	— 8	86	84
St. Louis	75	— 5	57	87
Detroit	88	None	88	94
Estimated national rate	93.5	None	°98.5	°99

°Based on steelmaking capacities as of these dates.



COMPOSITE MARKET AVERAGES

	May 26	May 19	May 12	One Month Ago April, 1945	Three Months Ago Feb., 1945	One Year Ago May, 1944	Five Years Ago May, 1940
Finished Steel	$58.27	$57.55	$57.55	$57.55	$57.55	$56.73	$56.08
Semifinished Steel	37.80	36.00	36.00	36.00	36.00	36.00	36.00
Steelmaking Pig Iron	24.05	24.05	24.05	24.05	23.55	23.05	22.05
Steelmaking Scrap	19.00	19.17	19.17	19.17	19.17	19.17	17.30

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material	May 26, 1945	April, 1945	Feb., 1945	May, 1944
Steel bars, Pittsburgh	2.25c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.25	2.15	2.15	2.15
Steel bars, Philadelphia	2.57	2.47	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.25	2.20	2.20	2.10
Plates, Philadelphia	2.30	2.25	2.25	2.15
Plates, Chicago	2.25	2.20	2.20	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.70	3.65	3.65	3.50
Sheets, hot-rolled, Gary	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.70	3.65	3.65	3.50
Bright bess., basic wire, Pittsburgh	2.75	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.90	2.80	2.80	2.55

Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$36.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	36.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	36.00	34.00	34.00	34.00
Wire rods, No. 5 to $\frac{9}{32}$-inch, Pitts.	2.15	2.00	2.00	2.00

Pig Iron	May 26, 1945	April, 1945	Feb., 1945	May, 1944
Bessemer, del. Pittsburgh	$26.19	$26.19	$25.69	$25.19
Basic, Valley	24.50	24.50	24.00	23.50
Basic, eastern del. Philadelphia	26.34	26.34	25.84	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	25.69	25.69	25.19	24.69
No. 2 foundry, Chicago	25.00	25.00	24.50	24.00
Southern No. 2, Birmingham	21.38	21.38	20.88	20.38
Southern No. 2 del. Cincinnati	25.30	25.30	24.80	24.30
No. 2 fdry., del. Phila.	26.34	26.34	26.34	25.84
Malleable, Valley	25.00	25.00	24.50	24.00
Malleable, Chicago	25.00	25.00	24.50	24.00
Lake Sup., charcoal, del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.19	25.19	24.69	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	140.33

Scrap				
Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.25	18.75	18.75	18.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke				
Connellsville, furnace, ovens	$7.00	$7.00	$7.00	$7.00
Connellsville, foundry ovens	7.75	7.75	7.75	7.75
Chicago, by-product fdry., del.	13.35	13.35	13.35	13.35

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941, Feb. 4, 1942 and May 21, 1945. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.

(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill Kaiser Co. Inc., $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop., $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $36; Detroit, del. $38; Duluth (bil) $38; Pac. Ports, (bil) $48. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives, Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., Kaiser Co. Inc., $56.64, Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $42. Detroit, del. $44; Duluth, billets, $44; forg. bil. f.o.b. Pac. ports, $54.

(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles).

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $36. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—$\frac{9}{32}$ in. inclusive, per 100 lbs., $2.15. Do., over $\frac{9}{32}$—$\frac{47}{64}$-in., incl., $2.30; Galveston, base, 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific ports $0.50. (Pittsburgh Steel Co., $0.20 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham base 20 tons one size, 2.25c; Duluth, base 2.35c; Mahoning Valley 2.32½c; Detroit, del. 2.35c; Eastern Mich. 2.40c; New York del. 2.59c; Phila. del. 2.57c; Gulf Ports, dock 2.62c; Pac. ports, dock 2.90c. (Calumet Steel Division, Borg Warner Corp., and Joslyn Mfg. & Supply Co. may quote 2.35c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St. Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.

(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		(.20-.30 Mo)	0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70c; Toledo 2.80c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City. New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00c, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.

(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O., base; Alan Wood Steel Co., Conshohocken, Pa., may quote 2.35c on hot carbon sheets, nearest eastern basing point.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.70c; Granite City, base 3.80c; New York del. 3.94c; Phila. del 3.87c; Pacific ports 4.25c.

(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.36c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific ports 4.25c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

...meling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 2.85c; Granite City, base 2.95c; Detroit, del. 2.95c; eastern, Mich. 3.00c; Pacific ports 3.50c; **20-gage;** Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.45c; Detroit del. 3.55c; eastern Mich. 3.60c; Pacific ports 4.10c.

...ectrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
...ield grade	3.30c	4.05c	3.30c
...rmature	3.65c	4.40c	3.75c
...ectrica	4.15c	4.90c	4.25c
...otor	5.05c	5.80c	5.15c
...ynamo	5.75c	6.50c	5.85c
...ransformer			
...72	6.25c	7.00c	.....
...65	7.25c	8.00c	.....
...58	7.75c	8.50c	.....
...52	8.55c	9.30c	.....

...t-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c. (Joslyn Mfg. ...may quote 2.30c, Chicago base.)

...old Rolled Strip: Pittsburgh, Cleveland, ...ungstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

...mmodity C. R. Strip: Pittsburgh, Cleveland, ...ungstown, base 3 tons and over, 2.95c; ...icago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.35c.

...ld-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 ...rb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 ...rb., 6.15c; over 1.00 Carb., 8.35c.

...in, Terne Plate

...n Plate: Pittsburgh, Chicago, Gary, 100-lb. ...se box, $5.00; Granite City $5.10.

...ectrolytic Tin Plate: Pittsburgh, Gary, 100-... base box, 0.50 lb. tin, $4.50; 0.75 lb. tin ...65.

...n Mill Black Plate: Pittsburgh, Chicago, ...ry, base 29 gage and lighter, 3.05c; Granite ...y, 3.15c; Pacific ports, boxed 4.05c.

...ng Ternes: Pittsburgh, Chicago, Gary, No. ... unassorted 3.80c; Pacific ports 4.55c.

...nufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; ...anite City $4.40.

...ofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. ...00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; ...lb. $17.25; 40-lb. $19.50.

...ates

...rbon Steel Plates: Pittsburgh, Chicago, ...y, Cleveland, Birmingham, Youngstown, ...rrows Point, Coatesville, Claymont, 2.25c; ...w York, del. 2.44c; Phila., del. 2.30c; ...Louis, 2.49c; Boston, del. 2.57-82c; Pacific ...ts, 2.80c; Gulf ports, 2.60c.

...ranite City Steel Co. may quote carbon ...tes 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. ...; Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. ...ntral Iron & Steel Co. 2.50c f.o.b. basing ...nts; Geneva Steel Co., Provo, Utah, 3.20c, ...b. Pac. ports.)

...or Plates: Pittsburgh, Chicago, 3.35c; ...cific ports, 4.00c.

...en-Hearth Alloy Plates: Pittsburgh, Chi...o, Coatesville, 3.50c; Gulf ports 3.95c; ...cific ports 4.15c.

...ought Iron Plates: Pittsburgh, 3.80c.

...apes

...uctural Shapes: Pittsburgh, Chicago, Gary, ...mingham, Buffalo, Bethlehem, 2.10c; New ...k, del. 2.27c; Phila., del. 2.215c; Pacific ...ts, 2.75c.

...oenix Iron Co., Phoenixville, Pa., may ...te carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, ...export; Sheffield Steel Corp., 2.55c f.o.b. ...Louis. Geneva Steel Co., 3.25c, Pac. ports); ...ser Co. Inc., 3.20c f.o.b. Los Angeles).

...el Sheet Piling: Pittsburgh, Chicago, Buf..., 2.40c.

...ire Products, Nails

...e: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufac...ers in carloads (add $2 for Worcester, $1 ... Duluth).

...ght basic, bessemer wire 2.75c

...ing wire 3.20c

... (Pittsburgh Steel Co., 0.20c higher.)

...e Products to the Trade:

...ndard and Cement-coated wire nails, ...nd staples, 100-lb. keg, Pittsburgh, ...hicago, Birmingham, Cleveland, Du...uth $2.90; galvanized, $2.55; Pac. ...rts .....$3.40 and $3.05

...ealed fence wire, 100-lb., Pittsburgh, ...hicago, Cleveland 3.20c

...vanized fence wire, 100 lb., Pitts...urgh, Chicago, Cleveland 3.55c

...en fence, 15½ gage and heavier, per ...se column ..... .67c

...ed wire, 80-rod spool, Pittsburgh, Chicago, ...eland, Birmingham, column 70; twisted ...less wire, column 70.

...ular Goods

...ed Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	61	49½	1¼	23	3½
2½-3	64	54½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-19	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1⅝"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $45.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates, $46 net ton, base, Standard spikes, 3.25c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung.	Chr.	Van.	Moly.	Pitts. base per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
†347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅝ and ⅞ x 6-in. and shorter	63½ off
Do., ⅝ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*7.00
Connellsville, foundry	7.50- 8.00
Connellsville, prem. fdry.	7.75- 8.10
New River, foundry	8.50- 8.75
Wise county, foundry	7.25- 7.75

By-Product Foundry

Wise county, furnace	6.75- 7.25
Kearney, N. J., ovens	12.65
Chicago, outside delivered	12.60
Chicago, delivered	13.35
Terre Haute, delivered	13.10
Milwaukee, ovens	13.35
New England, delivered	14.25
St. Louis, delivered	†13.35
Birmingham, delivered	10.50
Indianapolis, delivered	13.10
Cincinnati, delivered	12.85
Cleveland, delivered	12.80
Buffalo, delivered	13.00
Detroit, delivered	13.25
Philadelphia, delivered	12.89

*Operators of hand-drawn ovens using trucked coal may charge $7.75, effective Nov. 29, 1943.
†13.85 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do., tank cars	11.00c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$30.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	**5.106[1]**	5.224[14]	4.744[14]	4.144[11]	4.715	6.012[23]	6.012[23]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	**3.974[1]**	**3.974[1]**	5.010[12]	4.613[14]	4.103[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[14]	4.103[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[15]	4.872[25]	4.072[21]	4.772	5.816[23]	5.860[23]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[25]	4.052[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[20]	4.041[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.165[21]	.....	.....	.....
Bethlehem, Pa.*	.	3.45[1]	.	.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.	.	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.	.	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[15]	4.40[10]	3.75[21]	4.669	5.60[23]	5.75[23]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.50[1]	4.65[15]	4.30[10]	3.65[21]	4.35	5.60[23]	5.75[23]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[13]	4.40[24]	3.75[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[13]	4.30[24]	3.65[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[13]	4.40[24]	3.75[21]	4.45[21]	5.60[23]	5.65[23]
Cleveland (country)	3.25[1]	.	3.30[1]	..	3.25[1]	3.50[1]	3.50[1]	.	4.30[24]	3.65[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[12]	4.500[24]	3.800[21]	4.659	5.93[23]	5.93[23]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[19]	5.443[24]	4.443[12]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[19]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	6.391[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[19]	4.475[24]	4.011[21]	4.711	6.10	6.20
Youngstown, O.*	.	.	.	.	.	.	.	4.40[13]	.....	.....	.....	.....	.....
Middletown, O.*	.	.	.	.	3.25[1]	3.50[1]	3.50[1]	4.65[16]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[15]	4.20[24]	3.75[21]	4.65	5.75[23]	5.85[23]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[15]	4.337[24]	3.887[21]	4.787	5.987[23]	6.087[23]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[15]	4.568[24]	3.98[21]	4.78	6.08[23]	6.18[23]
St. Paul	3.76[2]	3.81[2]	3.81[2]	5.41[2]	3.51[2]	3.86[2]	3.86[2]	5.257[15]	4.46[24]	4.361[21]	5.102	6.09[23]	6.19[23]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[1]	5.172[15]	4.347[24]	4.031[21]	4.931	6.131[23]	6.231[23]
Memphis, Tenn.	4.015[5]	4.065[5]	4.065[5]	5.78[5]	3.965[5]	4.215[5]	4.215[5]	5.265[15]	4.78[24]	4.33[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.55[1]	5.903[1]	3.45[1]	3.70[1]	3.70[1]	4.75[15]	4.852[24]	4.54	5.215	.....	.....
New Orleans (city)	4.10[1]	3.90[4]	3.90[4]	5.85[4]	4.058[4]	4.20[4]	4.20[4]	5.25[26]	5.079[10]	4.60[21]	5.429	.....	.....
Houston, Tex.	3.75[2]	4.25[2]	4.25[2]	5.50[9]	3.763[8]	4.313[8]	4.313[8]	5.313[26]	4.10[10]	3.65[22]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	4.95[4]	7.20[4]	5.00[4]	4.95[4]	6.75[4]	6.00[12]	7.20[6]	5.583[22]	5.613	5.85[23]	5.95[23]
San Francisco	4.15[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	5.75[7]	6.35[15]	7.30[15]	5.333[21]	7.333	8.304[23]	8.404[23]
Portland, Oreg.	4.45[27]	4.45[27]	4.75[27]	6.50[27]	4.65[27]	4.75[27]	6.30[27]	5.75[15]	6.60[15]	5.533[15]	.....	.....	.....
Tacoma	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.60[15]	5.783[21]	.....	.....	8.00[23]
Seattle	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.05[15]	5.783[21]	.....	.....	8.00[23]

*Basing point cities with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 18 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton. 51½% (Natural)
Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50

Domestic (seller's nearest rail)

48% 3:1	52.80
less $7 freight allowance	

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, at dock most favorable to the buyer.

Provo, Utah, and Pueblo, Colo.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.7[illegible]

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Chemical Composition Limits, Per Cent — Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Electric furnace Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
NE 8612	.10-.15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70-.90	.85-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$26.00	$25.50	$27.00	$26.50
Newark, N. J., del.	27.53	27.03	28.53	28.03
Brooklyn, N. Y., del.	28.50	.....	.....	29.00
Birdsboro, Pa., base	26.00	25.50	27.00	26.50
Birmingham, base	†21.38	†20.00	26.00	.....
Baltimore, del.	26.61	.....	.....	.....
Boston, del.	26.12	.....	.....	.....
Chicago, del.	25.22	.....	.....	.....
Cincinnati, del.	25.06	23.68	.....	.....
Cleveland, del.	25.12	24.24	.....	.....
Newark, N. J., del.	27.15	.....	.....	.....
Philadelphia, del.	26.46	25.96	.....	.....
St. Louis, del.	25.12	24.24	.....	.....
Buffalo, base	25.00	24.00	26.00	25.50
Boston, del.	26.50	26.00	27.50	27.00
Rochester, del.	26.53	.....	27.53	27.03
Syracuse, del.	27.08	.....	28.08	27.58
Chicago, base	25.00	24.50	25.50	25.00
Milwaukee, del.	26.10	25.60	26.60	26.10
Muskegon, Mich., del.	28.19	.....	.....	28.19
Cleveland, base	25.00	24.50	25.50	25.00
Akron, Canton, O., del.	26.39	25.89	26.89	26.39
Detroit, base	25.00	24.50	25.50	25.00
Saginaw, Mich., del.	27.31	26.81	27.81	27.31
Duluth, base	25.50	25.00	26.00	25.50
St. Paul, del.	27.63	27.13	28.13	27.63
Erie, Pa., base	25.00	24.50	26.00	25.50
Everett, Mass., base	26.00	25.50	27.00	26.50
Boston, del.	26.50	26.00	27.50	27.00
Granite City, Ill., base	25.00	24.50	25.50	25.00
St. Louis, del.	25.50	25.00	.....	25.50
Hamilton, O., base	25.00	24.50	.....	25.00
Cincinnati, del.	25.44	25.61	.....	26.11
Neville Island, Pa., base	25.00	24.50	25.50	25.00
‡Pittsburgh, del. No. & So. sides	25.69	25.19	26.19	25.69
Provo, Utah, base	23.00	22.50	.....	.....
Sharpsville, Pa., base	25.00	24.50	25.50	25.00
Sparrows Point, base	26.00	25.50	.....	.....
Baltimore, del.	26.99	.....	.....	.....
Steelton, Pa., base	.....	25.50	.....	26.50
Swedeland, Pa., base	26.00	25.50	27.00	26.50
Philadelphia, del.	26.84	26.34	.....	27.34
Toledo, O., base	25.00	24.50	25.50	25.00
Youngstown, O., base	25.00	24.50	25.50	25.00
Mansfield, O., del.	26.94	26.44	27.44	26.94

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. †For phosphorus 0.70% or over deduct 38 cents. ‡For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

6.00-6.50 per cent (base)	$30.50		
6.51-7.00	$31.50	9.01- 9.50	36.50
7.01-7.50	32.50	9.51-10.00	37.50
7.51-8.00	33.50	10.01-10.50	38.50
8.01-8.50	34.50	10.51-11.00	39.50
8.51-9.00	35.50	11.01-11.50	40.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Electric Furnace Ferrosilicon: Sil. 14.01 to 14.50%, $45.50; each additional .50% silicon up to and including 18% add $1; low impurities not exceeding 0.05 Phos, 0.40 Sulphur, 1.00% Carbon, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron
Northern

Lake Superior Furn.	$34.00
Chicago, del.	37.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$24.50
Valley base	24.50

Low Phosphorus

Basing points: Birdsboro, Pa., $30.50; Steelton, Pa., and Buffalo, N. Y., 30.50 base; 31.74, del., Philadelphia. Intermediate phos., Central Furnace, Cleveland, $27.50

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differential: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick
Super Quality

Pa., Mo., Ky.	$66.55

First Quality

Pa., Ill., Md., Mo., Ky.	52.85
Alabama, Georgia	52.85
New Jersey	57.70
Ohio	46.35

Second Quality

Pa., Ill., Md., Mo., Ky.	47.90
Alabama, Georgia	39.15
New Jersey	50.50
Ohio	37.10

Malleable Bung Brick

All bases	61.65

Silica Brick

Pennsylvania	52.65
Joliet, E. Chicago	60.65
Birmingham, Ala.	52.85

Ladle Brick
(Pa., O., W. Va., Mo.)

Dry press	31.95
Wire cut	29.90

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net ton, carloads CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. (After Aug. 29 base price any grade $30.)

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, eastern, central and western zones, $135; add $6 for packed c.l., $10 for ton, $13.50 less-ton; f.o.b. cars, Eastern seaboard and Gulf ports, $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb. to c.l., 24.40c; medium 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa., $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central, 81c and 82.50c; western 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R.R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—High nitrogen, high carbon ferrochrome: Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65c for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrocnrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom. 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.35c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium; 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed; 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58. 50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ½c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract, carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up .25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%, car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western, spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max., sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract, ton lots, $1.89, less, $2.01, eastern, freight allowed; $1.903 and $2.023 central, $1.935 and $2.055 western, spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max. sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot, up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide approx. 2%, or Red Cake: Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.0%) Contract, any quantity, $1.10 eastern, freight allowed, per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5cto contracts in all cases.

Calcium metal; cast: Contract, ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309 Central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20% mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 18.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.) per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c, eastern, freight allowed; .063c, .0655c, .0755c and .078c, central; .066c, .0685c, .0855c and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ⅛ lb. silicon, bulk, c.l., 5.80c, 2000 lbs. to c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2060 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c f.o.b. shipping point, freight allowed. Price per lb. contained silicon.

Manganese Metal: (96 to 98% manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 36c, 2000 lb. to c.l., 38c, central, 36.25c, and 39c; western 36.55c and 41.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 34c; 2000 to c.l., 35c; central 34.25c and 36c; western, 34.55c and 38.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Spot, carlots, per lb. contained tungsten, $1.90; freight allowed as far west as St. Louis.

Tungsten Metal Powder: spot, not less than 97 per cent, $2.50-$2.60; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40 eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50, 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15% net ton to carload, 8c lb. f.o.b. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferro titanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80, highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern contract, carlots bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads bulk per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern contract basis, carloads in bulk or package, per lb. of alloy 14.00c, gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N. Y., per lb. 5.75c; ton lots 6.50c. Spot ¼ cent higher.

Simanal: (Approx. 20% each Si, Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 15 of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.25
No. 2 Heavy Melt. Steel	18.25
No. 2 Bundles	15.75-16.25
No. 3 Bundles	13.75-14.25
Mixed Borings, Turnings	9.50
Machine Shop Turnings	9.50
No. 2 Busheling	12.50
Billet, Forge Crops	20.75-21.25
Bar Crops, Plate Scrap	20.75-21.25
Cast Steel	20.75-21.25
Punchings	20.75-21.25
Elec. Furnace Bundles	18.75
Heavy Turnings	17.00

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices.)

No. 1 Heavy Melt. Steel	$14.33-15.33
No. 2 Heavy Melt. Steel	14.33-15.33
No. 2 Hyd. Bundles	12.83-15.33
No. 3 Hyd. Bundles	10.83
Chemical Borings	14.33
Machine Turning	6.50
Mixed Borings, Turnings	6.50
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	10.00-10.50
Short Shovel Turnings	14.00-14.50
Mixed Borings, Turnings	12.00-12.50
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	13.00-13.50
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06
No. 2 Heavy Melt. Steel	14.06
No. 1 Bundles	14.06
No. 2 Bundles	13.06-14.06
No. 1 Busheling	13.06-14.06
Machine Shop Turnings	5.50
Mixed Borings, Turnings	5.50
Short Shovel, Turnings	9.00
Chemical Borings	13.06
Low Phos. Clippings	16.56
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Short Shovel, Turnings	16.00
Mach. Shop Turnings	14.00
Mixed Borings, Turnings	14.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	21.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$21.00
No. 1 Heavy Melt Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	15.00-15.50
Cast Iron Borings	14.00-14.50
Machine Shop Turnings	11.50-12.50
Low Phos. Plate	21.00-22.00

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	11.00-11.50

BIRMINGHAM:

(Delivered consumer's plant)

Billet, Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails, Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
Baled Mach. Shop Turn.	16.25-16.75
No. 3 Galv. Bundles	14.25-14.75
Machine Turnings	10.50-11.00
Mix. Borings, Sht. Turn.	12.00-12.50
Short Shovel Turnings	12.00-12.50
Cast Iron Borings	12.00-12.50
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00
(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)	

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	12.00
Short Shovel Turnings	14.00
Mixed Borings, Turn.	12.00
Cast Iron Borings	13.00
Low Phos.	21.75

DETROIT:

(Dealers' buying prices)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	7.00- 7.50
Short Shovel. Turnings	10.50-11.00
Cast Iron Borings	9.50-10.00
Low Phos Plate	19.32-19.82
No. 1 Cast	20.00
Heavy Breakable Cast	13.50-14.00

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	$17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	6.50- 7.00
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19.00
Grate Bars	15.25
Brake Shoes	15.25
(Cast grades f.o.b. shipping point)	
Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	7.50- 8.00
Shoveling Turnings	9.50-10.00
Cast Iron Borings	9.50-10.00
Mixed Borings, Turnings	8.50- 9.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2 Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings, Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	6.90
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.50
Tin Can Bundles	14.50
No. 2 Steel Wheels	16.00
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.00
Uncut Frogs, Switches	16.00
Scrap Rails	16.00
Locomotive Tires	16.00

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum; 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less through 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low-grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.), 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B-107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American, bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224-lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: OPA ceiling prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz., $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193. Open market, spot, New York, nominal for 50 to 100 flasks; $158 to $163 in smaller quantities.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c; Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlot 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2%, 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c f.o.b. Niagara Falls.

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ¾c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil, 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.00c, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings 7.25c, old zinc 5.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 160

No easing is apparent in demand for sheets and strip, cancellations making little reduction in backlogs. Requests for material for civilian products are piling up but producers are unable to schedule them unless accompanied by validation under CMP.

Chicago — Sheet demand continues to pile up and little easing is taking place from cancellations. With the open-ending of CMP scheduled for July 1, sheetmakers expect heavy demand for unrated sheets in July and later, with prospects for accommodating it extremely dismal. U. S. Army Quartermaster, Jeffersonville, Ind., took bids May 23 on 30,000 portable shelters which will require 15,000 tons of sheets. A local fabricator of landing mat is trying to place 6500 tons of sheets for third quarter.

Pittsburgh — Mills are in a quandary as to disposition of the heavy volume of civilian goods inquiries. Some of the largest consumers, including automotive companies, are asking questions about sheet deliveries which cannot be answered under existing conditions except to report that no sheets will be available for such purposes during third quarter unless they are validated under CMP. Statements of WPB, including those by Chairman Krug, lead to belief a certain percentage of sheet tonnage, particularly that required for production of refrigerators and washing machines, will be validated and given a place on the schedule. There has, however, been no official action yet. New OPA prices announced last week were a disappointment in the sheet trade. In some instances hot-rolled and hot-rolled annealed sheets now command an equivalent or higher price than cold-reduced products, which is obviously an inequity. The same is true in galvanized sheets, and nonintegrated producers are in a bad spot with a $2 increase in semifinished certain to be applied by the large producers but with no compensating increase in finished sheet products for the nonintegrated mills.

Boston — Extension in narrow cold-rolled strip deliveries have slackened and producers still have limited openings for October; new bookings are slower and while consumers are covered generally through third quarter, there is caution as regards the fourth. This is due partly, primarily in spots, to lack of allotments for that period. Cancellations from war contract revisions continue surprisingly light, also inquiry based on open ending CMP for steel after July 1 beyond tonnage required for war. Current status of backlogs and schedules preclude much volume in this category, a situation likely to continue until more firm backlog tonnage is shaken out. Demand for alloys is maintained and tightness in hot material makes it difficult to meet delivery schedules. Stainless sheets and cold-rolled strip are open for September with at least one mill. Except for slightly heavier ship requirements for one yard, demand for sheets marks time with urgent and prompt needs filled by warehouses after considerable shopping for wanted sizes and grades. Scattered cutbacks in contracts involving sheet fabrication are reported with more expected in ammunition containers, but thus far volume is limited; in scattered instances a few new war contracts have been placed.

Cincinnati — The tight position of sheets has not been relieved. Pressure for shipment continues and district mills face an overload on near schedules. Under the circumstances a few cancellations do not affect overall conditions, and in most instances spot openings are quickly filled. Steelmaking of one district interest was curtailed because of a short supply of iron, but stocks enabled full utilization of rolling equipment. A big cut has been taken in shell steel requirements.

St. Louis — Sheet demand continues heavy and local mills are a month or more behind delivery schedules, due mainly to labor shortage. The labor situation improved slightly in February but has deteriorated steadily since. There is no sign of lessened demand and deliveries are extended to January. Scattered cancellations have been more than offset by new orders. Production has dropped to 75 per cent of capacity because of shortage of labor.

New York — Sheet deliveries generally are less extended. Most producers are quoting about the same months that they did two or three weeks ago, thus indicating some reduction in backlogs. However, deliveries are far extended, with hot-rolled pickled and cold-rolled available late this year and early next, and galvanizing covering a wide spread as usual, anywhere from November until late in first quarter.

The only grades that seem to be making some progress are electrical sheets

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and stainless steel sheets, the latter gaining some strength again after recent easing due to cutbacks in the aircraft industry. Stainless steel is now being quoted for September shipment in most cases and electrical sheets, late November or well into next year, depending upon grade. There have been relatively few spot openings in sheets. Some leading producers declare there have been no more cancellations over the past two weeks than in corresponding periods earlier in the spring.

Easing in backlogs may be ascribed primarily to the fact that major consuming interest is in nearby positions, which continue tight with little opportunity for trading.

The recent OPA advance of $1 a ton has brought the delivered New York price on galvanized up to 3.94c per pound. Hot-rolled sheet prices are unchanged on the basis of the $2 a ton interim price increase granted in January; and cold-rolled prices are unchanged, despite the fact that they have been holding at present levels for many months.

Cleveland — Delivery of sheets and strip continues the tightest of all steel products with mills booked into late fourth quarter and early next year. The few openings in rolling schedules that have developed since V-E Day are immediately filled, and largely involve fourth and third quarter delivery. The expected reduction in the shell container program, resulting from the cutback in ammunition schedules, has not yet materialized. However, reduction in landing mat program is reflected in lessened demand for clips. The carryover tonnage is still a factor on a few grades with some producers.

Of considerable interest to this area is the contemplated revocation of restrictions on production of washing machines and domestic mechanical refrigerators. Under the WPB plan it is proposed that refrigerator output will total 265,000 units nationally in third and fourth quarters and a total of 700,000 washing machines by the end of the year. Because of the competition that will exist for the limited tonnage of sheet steel for civilian goods production, WPB is expected to keep a watchful eye on inventories of the larger manufacturers and every effort will be made to aid small business interests in obtaining needed items. Steel producers are concerned over the best procedure in handling reconversion steel orders in an effort to satisfy former peacetime customers. First come first served appears to be the logical answer, but the necessity of bunching orders as to specifications will disrupt this scheduling somewhat. Some shifting of customers is a likely development in the early postwar period.

Philadelphia — Sheet buying is only moderately active. Most interest is in nearby positions, which are tight. Most sellers still quote late this year and early in next year on hot-rolled pickled and cold-rolled sheets. Galvanized shipments run from November through first quarter, depending on position of the individual mill.

Steel Bars . . .

Bar Prices, Page 160

Bar deliveries are a trifle easier, though on all but small rounds current orders are scheduled for late in the year or even next year. On large hot-top rounds deliveries in some cases are late in first quarter. Some civilian orders for bars are expected to be scheduled for third quarter as reduction in the shell program causes gaps in rollings. Cold drawn bars are holding better than hot-rolled, the rocket program being a factor.

New York — Deliveries on carbon bars continue extended, although there has been an overall easing. In other words, shipments fall late in the year and beyond on practically all but smaller rounds, but they are not as far advanced as they were recently. In some of the very large sizes of hot-top quality bars deliveries extend through first quarter of next year in certain cases; however, this schedule may show a more appreciable easing shortly as cutbacks in the large shell program, now proposed, have opportunity to take effect. There have been relatively few nearby spot openings so far.

Cold-drawn bars appear to be holding their own better than hot bars, due to the pressure that still exists for larger rounds for the rocket program in particular.

The recent increase of $2 a ton in hot-rolled bars and bar size shapes brings the market here up to 2.59c per pound delivered.

Pittsburgh — New price schedules failed to make any provisions for higher prices on cold-drawn bar products, which will have serious market repercussions

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unless some changes are made. Meanwhile, tonnages validated in bar mill products for third quarter will be down substantially for most producers with the result that some civilian goods will unquestionably be booked for delivery during that period. Most of the leeway has come as a result of cutbacks in shell production.

Boston — Only in spots, mainly smaller sizes in bolt and nut ranges have cold-drawn bars eased slightly; effect of cancellations on larger hot-rolled rounds will be reflected within the next few weeks, notably in July rolling schedules. Meanwhile demand and buying is more spotty, noteworthy in carbon more than alloy stock. Rockets and components are sustaining requirements for cold-drawn; specifications for forge shops have declined little and for truck parts some directives are still forthcoming. Armory and arsenal needs, however, tend downward and there are additional cutbacks in small arms, one involving 0.50 caliber machine guns, High Standard Mfg. Co., Hamden, Conn. As at the Westfield Mfg. Co., Westfield, Mass., fabrication of bazooka parts, normally building bicycles, first effect of cutbacks is reduction in overtime work. Aircraft engine production has suffered little in the East, and at Strafford, Conn., an expansion in equipment and facilities is under way at the Chance-Vought plant.

Cleveland — Alloy bar demand remains active in contrast with tapering in commercial carbon steel bar requirements. Although the overall ammunition and tank programs have been reduced, current production schedules have not been altered materially. Sellers are booked through fourth quarter on hot-top quality bars and on regular grades into November. Deliveries on electric furnace alloys fall into October and open-hearth alloys November. Revocation of all restrictions on production of automotive replacement parts should result in a substantial increase in demand from this source as Cleveland is a leading automotive parts center. Philip W. Frieder Co. Inc. is reported to have purchased 976 tons of alloy steel bars, 332 tons of alloy steel billets and 147 tons of carbon steel bars from the New York RFC surplus sales agency.

Philadelphia — Small common carbon bars are still available, with larger sizes falling late in the year and beyond. Hot-top quality bars in larger sizes are quoted for April shipment by one leading producer. Some electric alloy tonnage is available in September, though some producers have nothing to offer before October.

St. Louis—Pressure for bar delivery is increasing, the few cancellations failing to advance deliveries, which now fall in September and October.

Steel Plates . . .

Plate Prices, Page 161

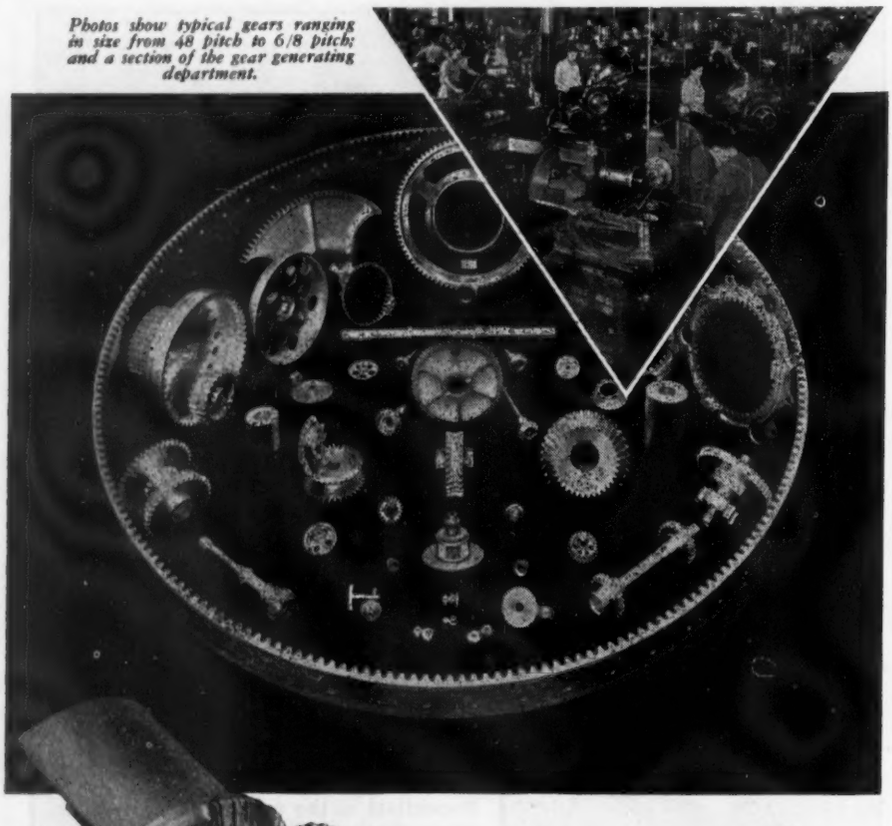
Plate demand continues to ease, mainly due to gradual completion of the shipbuilding program. Deliveries can be obtained for July and August and it is believed some unrated orders will be taken for third quarter. Restoration of contracts for four destroyers to a New England yard brings about 5200 tons, mainly plates. Maritime Commission is considering application for building of three fruit steamers.

New York — Plate buying continues to taper, reflecting in particular an easing in shipyard and warehouse demand. Deliveries are being quoted for July and August by most producers, with the likelihood that substantial tonnage of unrated orders will be worked in third quarter schedules, as a result of the recent open ending of CMP, whereby consumers can place orders now for scheduling after July 1.

The Office of Price Administration has permitted another increase of $1 a ton on carbon plates, bringing the delivered price here up to 2.44c. This represents an increase of $3 since Jan. 11, at which time an advance of $2 a ton was granted.

Boston — Contracts for four destroyers awarded to Bath Iron Works, Bath, Me., restores half the number canceled at that yard several weeks ago; approximately 5200 tons, mainly plates, including high tensile, will be required. Early procurement and delivery of steel is geared to an increase in construction of destroyers now on ways and four newly ordered. Plates for the canceled program had been placed for June delivery. For United Fruit Co. bids close June 18 with the Maritime Commission for construction of three 450-foot twin-screw, turbine driven, refrigerated cargo ships. Halt in employment withdawals at the Maine yard is likely; operating with 800 under MPC ceilings, 1400 employes have left the plant in six months. While new Navy requirements are heavier, miscellaneous buying is slow. Resumption of railroad passenger car building will eventually affect the Worcester

Photos show typical gears ranging in size from 48 pitch to 6/8 pitch; and a section of the gear generating department.



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shop, which has been fabricating lighter transit units. Steel for Worcester requirements is usually placed in the Chicago area. Another potential increase is for fishing boats; Atlantic Fisheries Co. will let contracts for a modern fleet.

St. Louis — With Maritime Commission shipbuilding contracts completed local plate production is entirely devoted to repairs and output has dropped from a high of 22,000 tons in January and April to about 10,000 tons currently. By July this is expected to level off at about 4000 tons per month. Released plate tonnage has been shifted to hot-rolled sheets, demand for which is heavy.

Cleveland — Mill delivery in plates continues to ease with shipments now promised for June. Orders for miscellaneous fabrication are only a fraction of former shipbuilding needs. However, steel plate shipments to the railroad industry should increase over coming months, as third quarter allocation of 1,339,588 net tons of steel for the transportation industry is the largest of any quarter this year. Railroads will benefit most from this increased steel allotment, which will go into new locomotives and freight cars, replacement rail and track accessories.

Philadelphia — There is talk of doing away with mill directives on plates after July 1, because of possibility there may not be sufficient specifications to fill the directives. However, there has been no official action, as far as can be learned. It is general'y conceded substantial plate capacity will be available for unrated tonnage in third quarter, with producers expecting some fairly good demand from Europe, provided there is easing in ocean transportation.

Tubular Goods . . .

Tubular Goods Prices, Page 161

Seattle — Cast iron pipe movement is handicapped by uncertain and slow deliveries. Potential demand in this area is strong. Spokane, Wash., has awarded a contract at $19,312 to Hughes & Co. for furnishing about 200 tons of cast iron pipe and fittings. Bids have been received by Bellingham, Wash., for the Marietta district system, involving 55,421 feet of various sizes of cast pipe. Seattle has opened bids for 48,000 feet of galvanized wrought iron pipe.

Wire . . .

Wire Prices, Page 161

New York — Wire mill bookings are lower and scattered cancellations, usually small individually, are slightly more numerous, but tonnage involved in cutbacks to date affects nearby delivery schedules little. Revisions in backlogs are expected to increase, with greater impact next month. Minor lots of rope wire have been cancelled but in the main large tonnage programs under continuing directives are maintained, notably in tire bead wire. Backlogs of numerous products extend well into fourth quarter, although some producers can get out music spring wire for third quarter. Deliveries to jobbers cover a wide range, depending on product, but in general are not improved. Buying of welding wire is substantially below peak and some shops are liquidating stocks left over from shipbuilding activity, including 717,000 pounds in original cartons owned by American Bridge Co., Ambridge, Pa. Despite this easing, however, some producers are in November on welding wire deliveries. Livingston & Southard Inc., New York exporters, have bought 123,244 feet of coil wire rope from surplus.

Boston — Heavier inquiry for prospective reconversion requirements is appearing and with it more confusion. Practically none of this volume can be firmed in future production schedules and while some is accepted on an if-and-when basis pressure for definite delivery promise is mounting. The extent to which future tonnage can be met depends on cancellations and cutbacks ahead. Currently there are few openings and indications are that the volume will be limited, beyond war requirements. There will be little available near July 1, when CMP is open-ended. Feelers are out by the automotive industry for space and tonnage and some forward orders, into next year, have been placed for clock spring stock with the hope deliveries will be advanced later. For bed and furniture springs heavy orders await placement. Some leveling off is in prospect for some types of Signal Corps wire and any material decline would open capacity for several fine and intermediate sizes and for galvanizing. Meanwhile aggregate buying has slackened, except for some fine specialties on which bookings are still in excess of shipments.

Chicago — Demand for wire and wire products continues substantial, with no easing in sight. As for merchant goods, except for some nails, jobbers have vir-

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tually no stocks of fence, posts, barbed wire, or netting.

St. Louis — Pressure is increasing for wire deliveries and demand for special types has extended delivery dates to the middle of 1946 in some cases. Some orders normally placed in this area have been forced to eastern producers. Labor supply continues tight.

Cleveland — Only minor adjustments in current wire production schedules have developed in recent weeks, with the few order cancellations reported largely affecting third and fourth quarter deliveries. In some instances shipments are in excess of new business, but overall order backlogs have held relatively unchanged with mills booked solidly through the year. Consumers' stocks of manufacturing wire are at unusually low levels, and same is true of jobbers' merchant wire inventories. Wire rod supply is particularly acute and no easing in requirements is indicated in the near future.

Tin Plate . . .

Tin Plate Prices, Page 161

Chicago — WPB is making an effort to increase output of tin plate, but meets little success in this district. Only a slight expansion is possible here because of the still critical manpower situation in steel plants as well as generally throughout the area. Car situation continues satisfactory and production is shipped promptly.

Rails, Cars . . .

Track Material Prices, Page 161

New York — Bids were closed May 24 by the Transportation Corps, United States Army, Cincinnati, on 1500 forty-ton gondolas for shipment to France. Inquiries are expected out shortly through the same offices for 6750 twenty-ton box cars. The 1500 gondolas and also the box cars are expected to be scheduled for fourth quarter delivery. Still later an additional 30,000 cars for the French are expected to be brought out for delivery early in 1946.

Domestic activity includes an inquiry for 500 fifty-ton box cars for the Union Pacific and an order for 400 fifty-ton box cars for the Missouri Pacific, placed with Pullman-Standard Car Mfg. Co., Chicago.

Mogyana Railway of Brazil is inquiring for nine 2-8-2 type locomotives, the Texas & Pacific, two or three 4-4-4-4 type locomotives and the New York Central for one 4-4-4-4 type locomotive.

Structural Shapes . . .

Structural Shape Prices, Page 161

New York — Rated structural work is light and while there is growing interest in postwar construction and substantial tonnages have been placed over recent weeks for fabrication on the "as, and when" basis, contractors show little interest in unrated work, where there is disposition to want the jobs to go ahead in the relatively near future. The open ending of CMP July 1 has encouraged many builders to believe there might be a chance of getting unrated work started this summer. But contractors figure the situation is still too uncertain, that as long as CMP certificates take precedence, definite scheduling of materials, especially important to a building program, is out of the question on an unrated job.

The situation may change as time goes on to a point where a reasonable amount of third quarter capacity may be available for unrated work, making it desirable to take a chance in some cases. Ship work, which has long been an important sustaining factor, continues to ease, and there likely may be a further easing in shapes as a result of curtailments in the shell program causing less pressure on steel and shape mill facilities. But at present, with mills booked into late August and September, the situation is too tight to warrant too much optimism, contractors declare.

Contracts are awarded for approximately 64,000 tons of fabricated structural steel for three housing projects in New York City. These projects are without priorities currently and fall in the postwar category but contracts are at firm prices, although months, and possibly two years may elapse before all steel is in place. For structural steel the firm price is reported to be about $20 below current quotations, in the neighborhood of $98 per ton. The projects will be erected by the Metropolitan Insurance Co., the contractor being Starret Bros. & Ekin, New York. Structural steel awards are: Stuyvesant Town project, 45,000 tons, to Bethlehem Steel Co., Bethlehem, Pa.; Peter Cooper Town, 13,000 tons, to American Bridge Co., Pittsburgh; Riverton project, 6000 tons to Lehigh Structural Steel Co., Allentown, Pa. Three producers share in large reinforcing steel contracts. Truscon Steel

Co., Youngstown, O.; Pittsbugh Steel Co., Pittsburgh; American Steel & Wire Co., Cleveland. Steel for windows has been awarded to Truscon Steel Co.

Chicago — Fabricators in this district have had a quiet week. Awards have been few and small and new inquiry is almost negligible. While mills have openings in August and later, the construction industry is doubtful that projects started can be carried through at any early period. Consequently, a watchful attitude is being adopted.

Pittsburgh — Despite the fact that steel is tight and manpower difficult, a fair amount of structural steel is available for sale. In fact there have been some indications of market weakness and at least one job has been sold at a reported price several dollars under previous levels. It is almost impossible to conceive of weakness in steel markets at the present time, in view of the recently approved price increases, but nevertheless this one case at least stands as evidence.

Boston — For outboard motor frames, delivery pressure for light structuals is urgent; unable to get wanted delivery from mills, one fabricator placed approximately 200 tons with warehouse. Three shops are engaged, building frames for Murray & Tregurtha Inc., Atlantic, Mass. These large motors power landing craft and play an important role in the Pacific. In other directions activity is slack. Inquiry includes a 300-ton deck plate girder bridge at Conway, N. H., bids May 29. In Rhode Island, first bridge under public works program is expected to be the Seaconnet span at Tiverton. Westinghouse will erect several additional buildings at East Springfield, Mass., one for the production of beverage cooling boxes to cost more than $1,000,000, as soon as authority is given for letting contracts. While minor openings appear in structural mill schedules, they are quickly filled and most mills are now in September on deliveries.

Philadelphia — Standard shape deliveries again are in September without exception, although one producer is quoting wide flange for July, due to some recent cancellations.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 161

Pittsburgh — Production directives for succeeding months have been increased by approximately 50 per cent and some additional tonnage is being booked on this basis. Most factors in the industry are agreed that no price increase will be applied to reinforcing bars, although the OPA order merely indicated that a $2 increase was granted on carbon steel bars. The market is active with new jobs being pushed as a result of elimination of some restrictions and many jobs which had been held up are now back for bidding. Some attempts have been made to break prices but no weakness has been reported and a fair tonnage has been placed in the past few days at full ceiling.

Pig Iron . . .

Pig Iron Prices, Page 163

Pig iron supply is about equal to consumption but neither producers or consumers are building stocks. Foundries would buy more heavily except for the limitations of labor supply. Banked furnaces at Buffalo have resumed after return of strikers on War Labor Board orders. In general melters have been able to build inventories close to the 30-day limit.

Cincinnati — Pig iron needs in the third quarter will be as heavy as at present, according to an informal survey by furnace interests. In fact, some melters indicate they want more iron, if it is available, and if the labor supply is easier. Shipments now are close to immediate needs, with most furnaces supplying this district virtually rationing tonnage at previous levels. Improvement in foundries' manpower situation, if any, is slow.

Buffalo — Bethlehem Steel Co. has resumed production in all six blast furnaces banked during the recent strike but output is not yet at full capacity. In spite of cutbacks sellers report a slight gain in orders. Small shipments are scheduled to move by barge canal, direct to a consumer's own dock. No iron is expected to move by canal this year to eastern storage points, as has been the practice in other years.

Boston — Without much change in melt, still retarded by labor shortages, pig iron deliveries this month are slightly higher; cutbacks thus far have held back little tonnage. June shipments will continue geared to current production and in most instances melters have built up 30-day inventories. To this extent pressure has eased, although in the case of basic there is slight leeway; two producers recently offered foundry iron from

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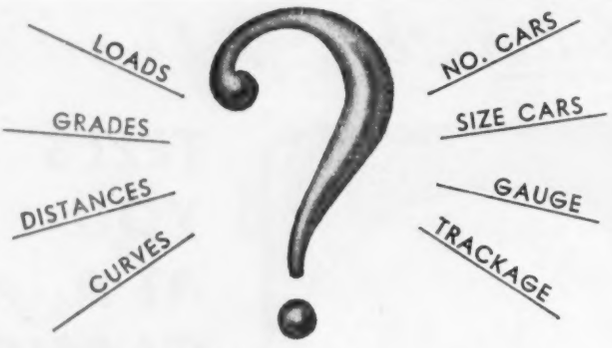
stock against a 150-ton Navy inquiry, both integrated steel works furnaces. Removal of restrictions on manufacture of paper mill machinery and parts may show up in third quarter inquiry. Considerable backlog of requirements has built up in that industry.

New York — Pig iron consumption here shows little variation, although there is somewhat less pressure for foundry iron than two or three weeks ago. This is ascribed not only to the fact that deliveries are freer, but that the fuel situation is finally adjusting itself and there is less concern among consumers of iron on that score. Manpower continues to restrict melting operations, there being to date no easing in this situation. Most foundry operators assert they could do considerably more work were sufficient labor available.

Cleveland — No check in pig iron consumption has resulted from adjustments in war production schedules in this area. Expanded Pacific war demands, plus heavy war-supporting needs are expected to necessitate peak gray iron castings production for a considerable time. National Malleable & Steel Castings Co. and Lake City Malleable Co. are the only foundries in this area affected by contract cancellations since V-E Day, but new work has more than offset these cancellations. Gray iron castings production is still below war requirements, despite the fact that March output of 857,616 tons nationally was the largest since 1941. Superimposed on demand for castings for trucks and other vehicles are recent civilian demands for machine tool castings, farm machinery and freight car construction. Blast furnace operations are off slightly with Republic banking one unit to conserve coal stocks. Foundry interests and producers have been unable to build up stocks. Jones & Laughlin Steel Corp. is scheduling closing steel foundry operations at its Otis plant here about Aug. 15.

Chicago — Pig iron continues in fairly tight position here. While some foundries have had some castings tonnage canceled or cut back, backlogs are of such volume that current schedules are promptly filled up. Cancellations in steel castings for tanks have reduced demand for iron momentarily, while shops alter their production lines to make ready for runs on other types of castings. For the next two months, at least, an overall castings production rate seems assured.



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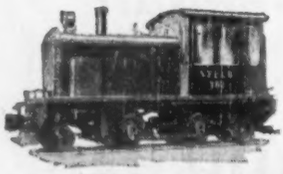

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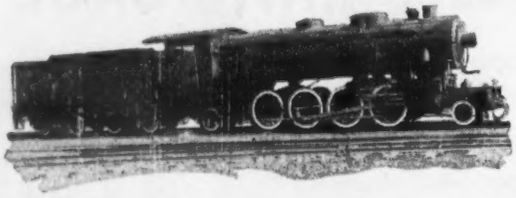

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Scrap . . .

Scrap Prices, Page 164

Quiet prevails in the steel and iron scrap market, with supply and consumption fairly well balanced. Delay in preparation continues in absence of additional yard labor. Weakness in eastern Pennsylvania continues but in other areas ceilings prevail in steelmaking grades, only borings and turnings showing weakness. Cast grades continue scarce and strong.

Boston — Easier price trend of steelmaking grades is marked by a further decline of $1 per ton on machine shop turnings, with slow demand for light scrap. Port differentials on all grades are not paid now, which in effect represents a decline in some areas, although brokers buying for eastern Pennsylvania melters have not paid them for some time. Short shoveling turnings and No. 2 bundles are none too firm and demand for this grade of bundles is slack. Low phos scrap also is unsteady. For 600 tons of unprepared heavy melting steel, accumulation for June at Boston navy yard, the high bid was $9.66. At the other end of the picture, regular No. 1 heavy melting steel is tight, as are foundry cast grades, with offerings readily taken. Gray iron foundries are still using more steel scrap than usual in some melts.

New York — While Pittsburgh consumers of heavy melting steel are still drawing on supplies here, the general movement is a little less active. This is noticeable also in machine turnings and mixed borings and turnings, prices apparently having reached a point where sellers are less inclined to trade. Because of limited supply cast grades are moving slowly, with prices at ceiling levels. For the first time in three or four weeks, there have been no important changes in brokers' buying prices on any of the leading grades of iron and steel scrap.

St. Louis — New scrap orders are virtually absent, with a few small users placing token orders. Large consumers are out of the market and take nothing but railroad grades. Shipments are heavy to fill unexpired commitments, most of which will expire at the end of May. Considerable St. Louis scrap is moving to Chicago at ceiling prices, to fill heavy demand there. Cast grades are moving well but are weakening. Ma-

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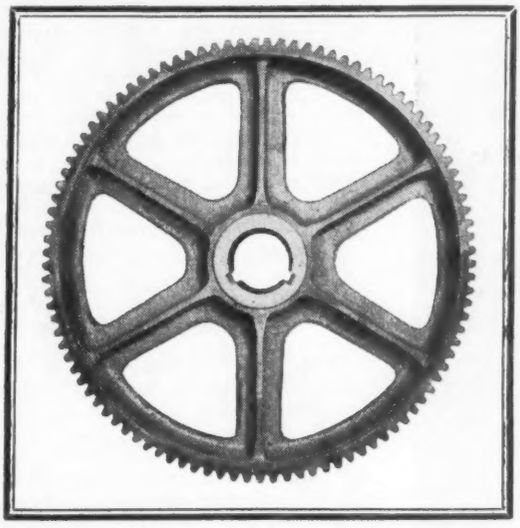

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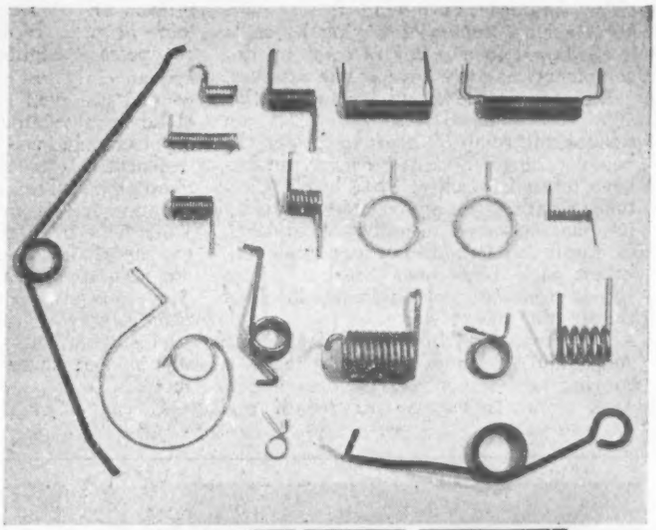

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chine turnings are offered freely, with no takers. Absence of buying by mills is attributed to a policy of awaiting developments as most have ample reserves.

Buffalo — A leading consumer in this area has reduced offering prices on steelmaking scrap 50 cents to $1 per ton below ceiling. So far, however, dealers have refused to sell at these levels. Caution prevails as no appreciable new business has appeared recently. Abundance of turnings has forced prices down another $1. Bethlehem Steel Co. has lifted an embargo on shipments in effect during the recent strike.

Cincinnati — Iron and steel scrap tends dull, although a good tonnage is moving against contracts. Some important contracts expire this month and brokers and dealers display caution less there be pressure on prices when buying reappears. Lighter grades are weak and an early test is expected. Yards in general are well stocked, with shortage of labor preventing more speed in moving accumulations.

Seattle — Steelmakers are receiving more prepared scrap from dealers and the situation has improved in recent weeks. Yards have been short of labor but dealers report the situation improving. Mills are able to obtain more labor and improve output. Foundries report sufficient supply of cast scrap to allow capacity operation. Pig iron is difficult to obtain and more cast scrap is being melted.

Chicago—Scrap prices are unchanged, although a flurry a week ago threatened a drop of $1 in machine shop turnings, the least stable of loose grades. This item has held at $11 for several weeks, but a prominent mill offered $10 and got some takers, but the volume is not regarded as sufficient to set the market. Most brokers have contracts at the higher level and disclaim interest in new business at less. Heavy melting material, not too plentiful, holds steady in demand.

Philadelphia — Heavy melting steel prices in this district have settled to $18.25, delivered consumer's plant and have steadied somewhat at that level. Heavy turnings have dropped to $17. All other prices are unchanged, with buying generally rather spotty.

Cleveland — Until a clear view of the operating prospects is possible, both mills and dealers will not be actively in the market for scrap. Dealers are closing out old contracts and are anxious to unload scrap inventories at present prices. Open-hearth scrap supply is adequate in relation to current requirements. War contract cutbacks have reduced production of turnings, which has eased pressure for further reduction in price. Good open-hearth scrap is moving at ceiling prices, but in some instances payment of the springboard have not been met in full.

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Warehouse . . .

Warehouse Prices, Page 162

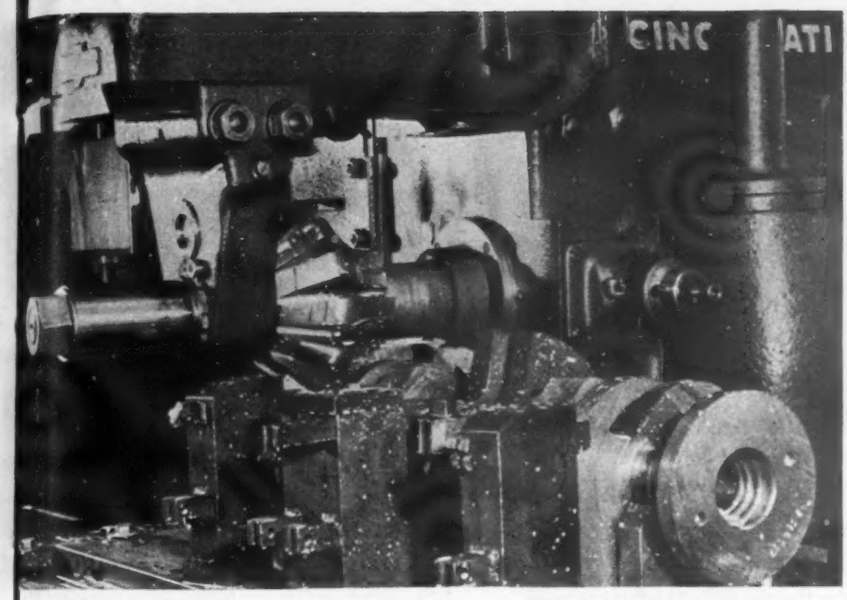
New York — Orders for steel from warehouse continue heavy. With some distributors May sales will approximate April, despite slight, if any, improvement in overall replacements, making for unbalanced inventories. Coverage against current contracts rather than cutbacks accounts largely for any declines in new buying. Alloy volume holds at high levels.

Boston — Warehouse stocks are low on the few products on which they are permitted to pass on recent price advances, namely most, but not all wire and wire items. Loss of interim advances means distributors will absorb $4 a ton on flat galvanized sheets. Slight decline in buying has had little effect on alloy demand. Except in minor spots, one being plates, replacement of carbon steels has improved, but slightly. While surplus up for redistribution has limited application among numerous fabricators, a Connecticut machine tool builder has bought 120 tons of bars, mainly alloy, from excess inventory.

St. Louis — Pressure on warehouse steel is declining somewhat but sales volume still is high. Inventories are low, particularly in bars and tubular products. Dealers expect no relief until July or August, when mill cutbacks are likely to be reflected in better warehouse stocks.

Los Angeles—While future outlook for warehouses is brighter, cutbacks have not yet eased deliveries from mills. Sales are off slightly but replacements are slower. Sheets, some wire items and bars are in most need. Mills inform warehouses that cancellations will have little effect for many weeks.

Cleveland — Steel distributors will not be able to pass on the recent steel price increase granted producers except for such items as merchant wire, nails and staples, bale ties, twisted and barbed wire, and roofing and siding. It is estimated that the inability to pass on the



From Blueprint to Product

The illustration shows a form relieved milling cutter gang, which is used in milling cast steel alloy crankshafts for the 500 H. P. Ford eight cylinder tank engine.

The crankshaft which has a Brinell hardness of 255 to 286 is milled in a Cincinnati-Hydromatic Mill 45x48. The operation shown, which is made in one cut, is the milling of the profile of crank checks and counterweights in one setting. The operation consists of eight separate cuts of approximately 11" face area x 1⅜" wide.

The cutter operates at 40 R.P.M. with a feed of 1" to 1½" per minute. The cut varies from ⅛" to ½" deep. The production per machine is 1 to 1.2 shafts per hour or nine shafts per machine in eight hours. A soap water solution is used as a coolant. From nine to sixteen shafts per tool are milled with each sharpening.

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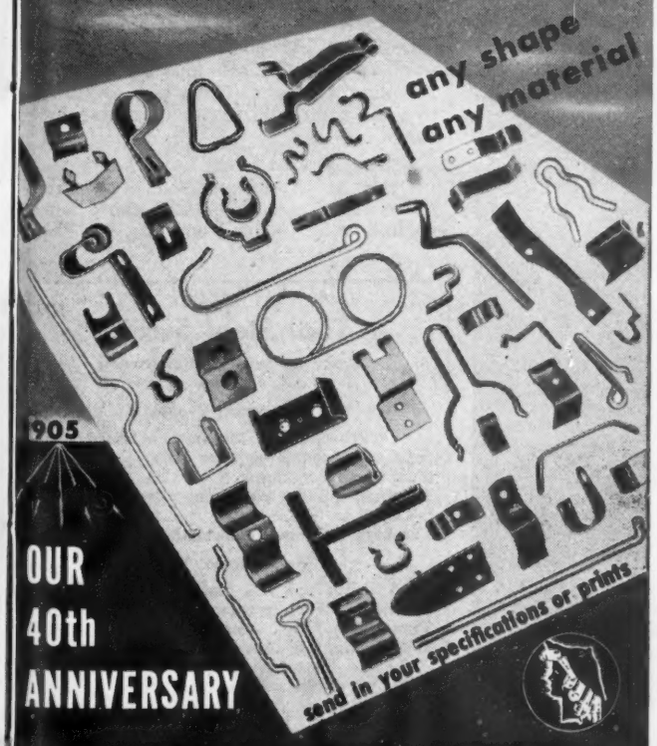

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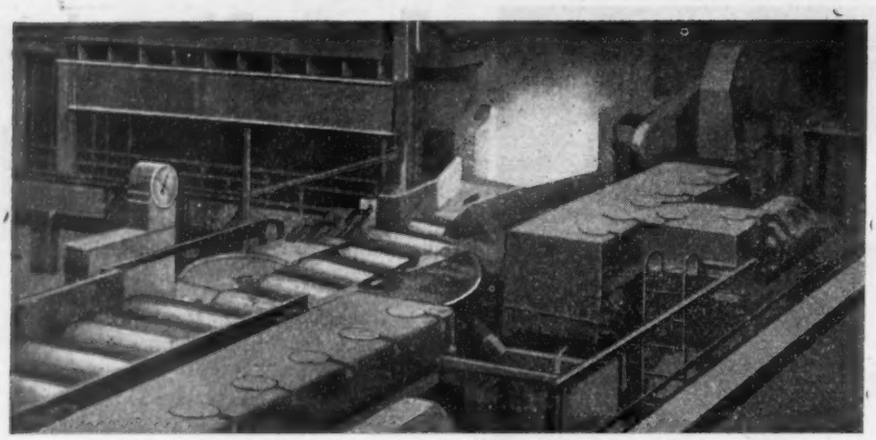

Recording Ingot Weights

Accurately . . . Remotely

This illustration shows a type B recorder automatically checking rolling mill production by printing the weight and heat number of each ingot as it revolves on a turntable. Weighing requires no stopping of production. A complete heat can be printed on one ticket. The machine automatically advances the ticket for each weight. A remote indicator in the Roller's Pulpit shows the weight simultaneously with its recording by the parent machine. This helps the operator to plan his work. Streeter-Amet recorders are widely used in Blooming and Finishing Mills. Write for a bulletin.

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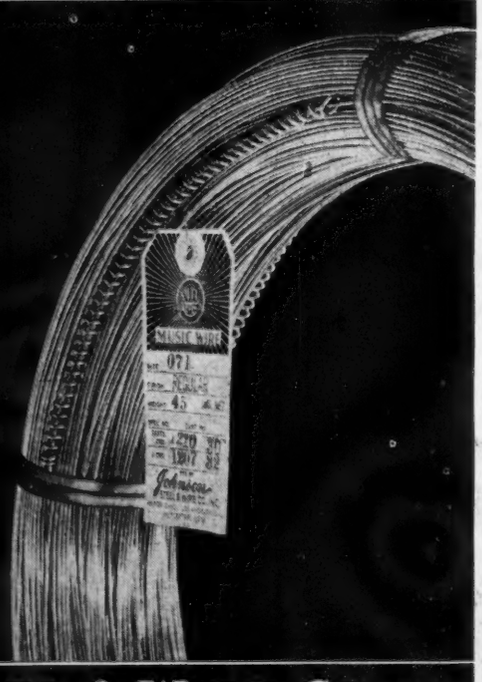

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upward price adjustments in other steel products, such as in plates, sheets and bars, will cost the industry $6 to $7 million annually. Warehouse interests report a tapering in shipment out of stock, with the estimated decline for the month expected to be 5 to 10 per cent. Distributors' stocks of plates, shapes and commercial bars are fairly good. However, inventory position in sheets and most alloy is well below desired levels. Manpower shortage continues to delay shipment from warehouse stock, particularly when cutting and shearing are necessary.

Cincinnati — Demand for warehouse steel is being sustained at a high level. A recent dip in ordering, possibly due to V-E Day interruptions, proved only temporary. Receipts from mills have supported sales volume, a feature being a much improved stock of structurals.

Chicago — Delivery of steel out of warehouses has been paralyzed or greatly reduced for over a week by a strike of union truck drivers. Current warehouse orders are well maintained, and inventories remain unbalanced. A feeling exists that steel supply may improve after July 1 when CMP is open ended.

Iron Ore . . .

Iron Ore Prices, Page 162

Consumption of Lake Superior iron ore in April totaled 6,641,552 gross tons, compared with 7,082,076 tons in March and 7,272,566 tons in April 1944, according to the report of the Lake Superior Iron Ore Association, Cleveland. For four months this year consumption aggregated 27,076,751 tons, against 29,620,408 tons in the comparable period last year.

Ore on hand at furnaces and Lake Erie docks totaled 16,428,765 tons May 1, compared with 17,303,561 tons a month earlier and 17,891,801 tons a year earlier. Furnaces in blast May 1 numbered 168, with 170 active a month earlier and 173 on May 1, 1944. Idle furnaces were 17, 15 and 13 at corresponding date. Canada has seven active and three idle at each of these three dates.

First report on Great Lakes ore vessels by the M. A. Hanna Co., Cleveland, shows the fleet contains 287 ships, a net decline of 30 vessels from May 15, 1944,

Tool Steel Scrap

Cents per pound, to consumers f.o.b. shipping point

Tungsten Types

(For each 1% tungsten contained)

Solid scrap containing over 12%	1.80
Solid scrap containing 5 to 12%	1.60
Turnings, millings containing over 12%	1.60
Do, 5 to 12%	1.40
Turnings, millings, solids under 5%	1.25

Molybdenum Types

Solid scrap, not less than 7% molybdenum, 2.50% tungsten	12.50
Turnings, millings, same basis	10.50
Solid scrap, not less than 3% molybdenum, 4% tungsten, 1% vanadium	18.50
Turnings, millings, same basis	11.50

Mixed Scrap

(Molybdenum and Tungsten Types)

Solid scrap, each 1% contained tungsten	1.60
Solid scrap, each 1% molybdenum	.80
Millings, turnings, each 1% tungsten	1.40
Millings, turnings, each 1% molybdenum	.70

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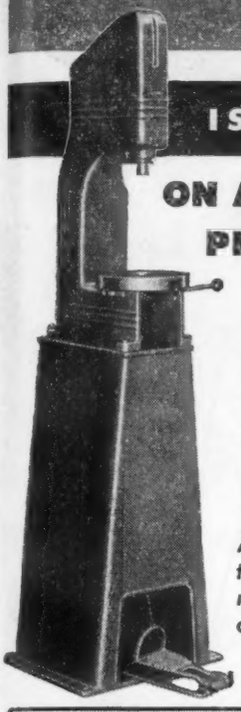

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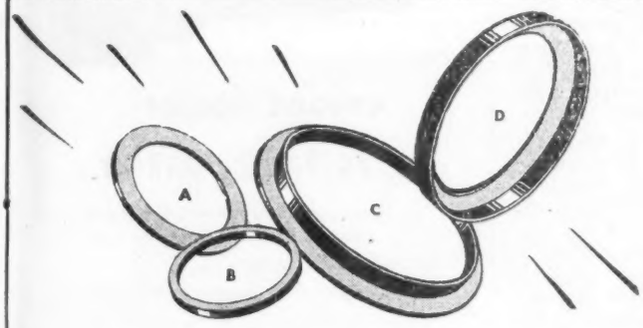

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when 317 were listed. Engaged in the ore trade May 15 were 270 vessels, compared with 291 a year earlier. Trip capacity is 2,788,550 gross tons at 20-foot draft, compared with 2,969,990 tons a year ago. War Shipping Administration vessels number 15, with trip capacity of 104,800 tons.

A new listing is Roen Steamship Co., Sturgeon Bay, Wis., with the 600-foot, 12,000-ton ship sunk last year in the Straits of Mackinac and salvaged by Captain Roen after it was abandoned by the underwriters.

Steel in Europe . . .

London — (*By Radio*) — Sheet demand is at a high level in Great Britain but platemakers need more orders. Pig iron supply is adequate for all demands under present conditions. Railroad car and locomotive shops take substantial tonnages of steel for rehabilitation work.

Surplus Tool Sales in East Show Increase .

Boston — Disposal of surplus machine tools through the RFC agency in this district, at a diversified and somewhat higher rate than expected, is featured by sales in textile machinery builders. Whitin Machine Works during the first half of this month bought 76 machines for $108,747.78 and earlier purchases include gear shapers, lathes, disk grinders, broaching machine and hobbing machines. Draper Corp., Hopedale, Mass., has taken additional heat-treating equipment while E. G. Budd Mfg. Co., Philadelphia, bought 21 used drill presses and drills at $10,645.09. While the number of small individual single unit machinery sales is maintained, there is sharp drop in purchases of excess or surplus steel products thus far this month.

New York—Largest sale of machines, 268 units, yet made by the RFC surplus disposal agency, New York, has been made to Singer Mfg. Co. at $432,360.68. The same company, for Brooklyn, purchased a cupola and auxiliary equipment, $25,000; seven boring, grinding, vertical drill machines, $10,486.64; various machine tools and equipment, 216 pieces, $410,602.86.

REINFORCING BARS . . .

REINFORCING BARS PLACED

200 tons, plant, Winthrop Chemical Co., Rensselaer, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

REINFORCING BARS PENDING

1000 tons, body plant, Studebaker Corp., South Bend, Ind.; general contract to S. N. Neilsen Co., Chicago; bids May 17.

600 tons, negro housing project, Newark, N. J.
300 tons, St. Regis Paper Co., Deferiet, N. Y.
250 tons, press shop, E. G. Budd Mfg. Co., Detroit.

200 tons, buildings 12 and 12A, Buick Motor Co., Detroit.

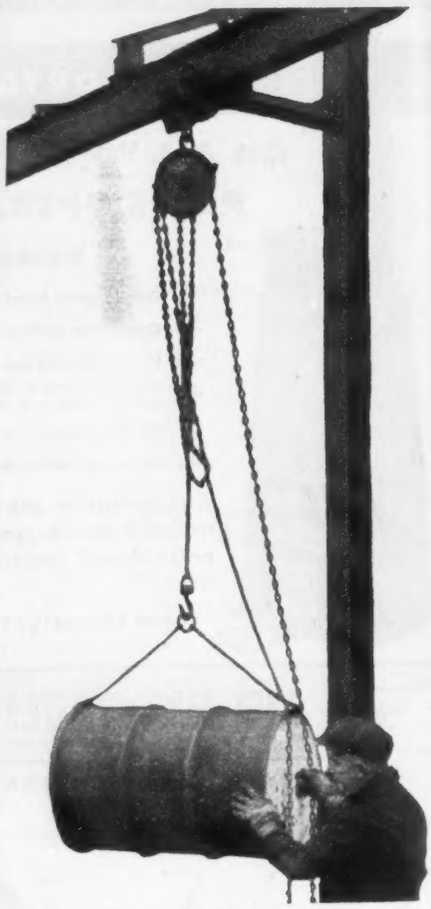
145 tons, highway construction, route 25, New Jersey; bids June 11, Trenton.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

500 tons, coach repair shops, Chicago, for Chicago, Rock Island & Pacific railroad, to Duf-

MULTIPLY MANPOWER
with READING HOISTS



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Buffalo WIRE WORKS CO., INC.

437 TERRACE BUFFALO 2, N. Y.

fin Iron Works, Chicago; F. K. Ketler Co., Chicago, contractor; bids May 10.

400 tons, storehouses, Pocatello, Idaho, for Bureau of Yards and Docks, U. S. Navy, to Structural Steel & Forge Co., Salt Lake City, Utah.

300 tons, sheet piling, bridge protection, Indiana Harbor, Ind., for New York Central railroad, to Inland Steel Co., Chicago; Fitz Simons & Connell Dredge & Dock Co., Chicago, contractor.

200 tons, outboard motor frames, Murray & Tregurtha, Inc., Atlantic, Mass., to West End Iron Works, Cambridge, Mass.

160 tons, generator house, Brooklyn Union Gas Co., Brooklyn, N. Y., to Bethlehem Steel Co., Bethlehem, Pa., through United Engineers, Philadelphia.

134 tons, 19 water tower supports, for Northern Pacific railroad, St. Paul, to Pittsburgh-Des Moines Steel Co., Pittsburgh; bids April 19.

STRUCTURAL STEEL PENDING

5000 tons, assembly plant, General Motors Corp. at Wilmington, Del.; bids at Detroit May 25.

1050 tons, Navy air supply depot, Philadelphia; bids May 25.

400 tons, body plant, Studebaker Corp., South Bend, Ind.; general contract to S. N. Nielsen Co., Chicago; bids May 17.

840 tons, heat treating building, Ingersoll Steel & Disc Division, Borg-Warner Corp., Chicago.

300 tons, deck plate girder bridge, Conway, N. H., bids May 29, Concord, N. H.

250 tons, highway bridge, Panama City, Fla.

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CAST IRON PIPE PLACED

315 tons, 8 and 10-inch, Falmouth, Mass., to United States Pipe & Foundry Co., Burlington, N. J.

CAST IRON PIPE PENDING

424 tons, 12-inch, Andover, Mass.

RAILS, CARS . . .

RAILROAD CARS PLACED

Missouri Pacific, 400 fifty-ton box cars, to Pullman-Standard Car Mfg. Co., Chicago, 200 for St. Louis, Brownsville & Mexico and 200 for International-Great Northern; subsidiary lines.

RAILROAD CARS PENDING

Transportation Corps, United States Army, Cincinnati, 1500 forty-ton gondolas, for shipment to France, bids closed May 24.

Union Pacific, 500 fifty-ton box cars; bids asked.

LOCOMOTIVES PENDING

Mogyana Railway of Brazil, nine 2-8-2 type locomotives, bids asked.

New York Central, one 4-4-4-4, type locomotive, bids asked.

Texas & Pacific, two or three 4-4-4-4 type locomotives, contemplated.

AFL Unions Win Elections At California Shell Plant

American Federation of Labor unions won an election recently at the Kaiser Steel Co. shell plant at Fontana, Calif., and defeated the Congress of Industrial Organizations in all of five various groups of plant employes. The election was held to determine the bargaining agent for 1300 workers.

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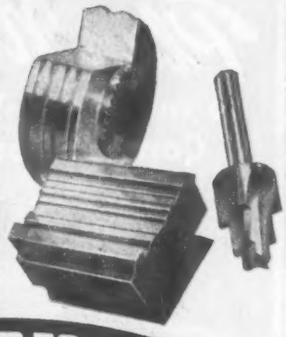

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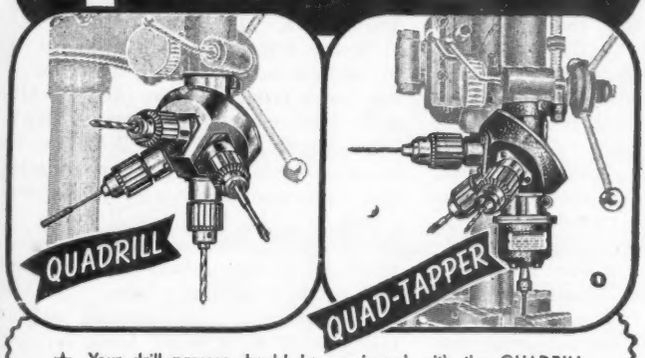

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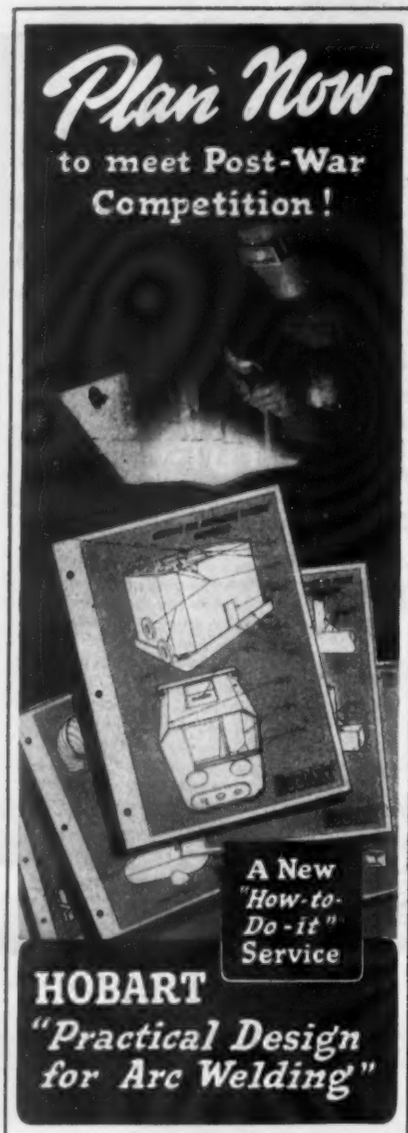

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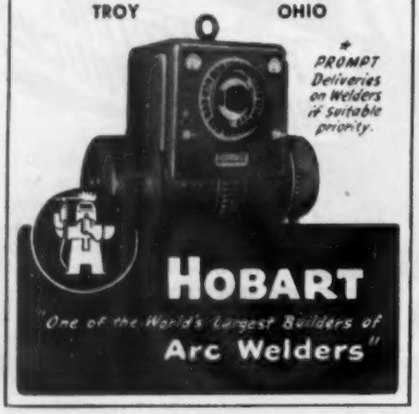

Steel Price Increases Held Inadequate To Offset Costs

(*Concluded from Page 74*)

Ind., said the OPA increases are "wholly inadequate to meet the serious losses now being suffered by many steel companies."

The committee added that "the very existence of these companies and the livelihood of their employes are at stake. In these circumstances, there is no alternative but for them to continue to fight for relief to which they are lawfully entitled. Serious consideration will be given to appeal from this ruling to the Emergency Court of Appeals.

"In arriving at its decision, the OPA disregarded three major factors of cost in the business of small companies.

"It overlooked the fact that the cost of raw materials to a small company which must buy these materials outside is higher than to a company which makes its own.

"It has refused to take into account the amortization of emergency war facilities notwithstanding the fact that this is an item of deductible cost recognized by the Treasury Department. Most companies with war-expanded plants are attempting to amortize them under the government's 60-month plan.

"And lastly, the OPA refused to take into account the wage increases resulting from adjustment of so-called 'wage inequities' ordered by the War Labor Board. The board stated in its directive that this adjustment process could reach 5 cents an hour average per employe. For most companies these adjustments must be paid retroactively to Jan. 4, 1944.

"The OPA is required by law to correct prices for any products showing an out-of-pocket loss. Such losses for various carbon steel products were ranging up to $9 a ton, before the recent wage advance.

"Against these losses, the amount restored by the OPA by the present increase and by the interim increase early this year, is only about $2 a ton. Even that gain would disappear if current large volumes were to drop."

Walter E. Watson, chairman of the OPA General Steel Products Advisory Committee and vice president, Youngstown Sheet & Tube Co., declared the permitted increases fall short of what is required and said the industry will continue to seek relief.

"Price increases for certain carbon steel products just announced by OPA are sorely needed, and are most welcome. The fact remains, however, that the increases granted fall far short of providing fair and equitable prices for the steel industry, which, while operating at the highest levels in its history, is losing money on a very large percentage of its business, whether measured in terms of tonnage or sales dollars. This loss is occurring in the items constituting the bulk of the normal production of the steel companies, including billets, slabs, hot-rolled bars, hot-rolled sheets, plates, skelp, rails, tube rounds, wire rods, wire, and many wire products.

"The price increases fail to give any recognition to the retroactive feature of the heavy wage increases imposed on the industry by the War Labor Board. Even reimbursement for a substantial portion of the wage increases currently accruing was omitted; furthermore, no recognition is given to cutbacks in steel production and the expected swing from war specialties, on which there is a reasonable profit, to the bread and butter items largely produced at a loss.

"The meager price changes announced by OPA are the result of the narrowest possible application of OPA pricing standards. Because the industry is now earning on an overall basis, at full operation, as much (but only before deduction for federal taxes) as it earned during the average of the years 1936 to 1939, OPA will raise ceiling prices on products now being sold at a loss, only to permit the industry to recover less than bare average manufacturing costs, which do not include sales and administrative expenses; consequently, the new ceiling prices provide no profit, and not even the recovery of full costs on the large percentage of the production of the steel industry.

"Except for the increases just announced, the steel industry's current prices are still the prices published in 1938, a depression year, and the new prices are considerably below 1937 steel prices. In spite of doubling in sales and production, OPA takes the view that the industry should not complain unless total dollar earnings are less than in the period 1936 to 1939. This ruling spells ruin for many companies, particularly the smaller ones. It will most certainly not contribute to full employment. Unquestionably, the industry will continue to seek the relief to which it is entitled."

"Every effort" to obtain further and satisfactory price adjustments will be made, according to Frank Purnell, president, Youngstown Sheet & Tube Co., Youngstown. Mr. Purnell said:

"Every little bit helps, of course, but in our opinion the price increases on certain steel products announced by OPA will cover only a small part of the increased costs which have been imposed upon steel plants by government action and otherwise since steel prices were frozen in 1941. It is a well-known fact that a large portion of the steel tonnage produced in the ordinary line of products has been sold at a loss.

"The present price increases will not take care of these losses. Moreover, with a reduction in demand for wartime materials and a return to peace-time production, there is a definite probability of reduction in rates of operation in the future as compared with those which have prevailed over the last four years. This reduction in rates of operation will eliminate whatever margin of profit there has been in the steel business and, unless full recognition is given to these facts, great hardship and harm will result not only to the industry but also to the employment situation and to the national economy.

"We expect to make every effort to have our price situation adjusted to a satisfactory basis by whatever means may be available to us."

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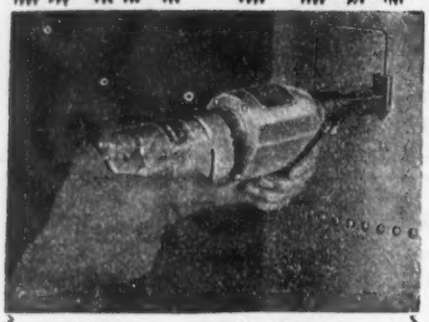

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Slow Start Made on Reconversion To Civilian Goods Production

(*Concluded from Page* 78)

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Laundry equipment	3	3
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On a national basis war contract cutbacks since V-E Day have not been as large as expected, but there is a strong indication that the tempo of these cutbacks will be stepped up materially soon following completion of a survey by procurement agencies of munitions needs.

Latest data available show that for the period May 1-12, contract cutbacks totaled $3 billion. The Detroit area was most affected, accounting for 32 per cent of the total cutbacks. Effect on other key centers was as follows: Chicago, 15 per cent of the total; Philadelphia, 10, and Cleveland, 7 per cent.

Cutbacks, revisions and terminations in production of medium and heavy artillery ammunition components were announced last week by the Army, following an all-day conference at Chicago with officials of the War Production Board, the War Manpower Commission and 88 contractors.

The adjustments affected production of boosters, time train rings, and three different types of ammunition fuzes.

The majority of companies received immediate cuts ranging from 33 to 60 per cent of current production, while 24 companies received complete contract cancellations. The 24 complete cancellations were principally at the manufacturers' own requests to reconvert to civilian production, and in several instances work had not been started on scheduled production.

On the basis of consultation with the manufacturers at the Chicago meeting it was estimated that 7500 workers in the affected plants, engaged in fuze and booster production, will be released.

Despite an increase in war contract cutbacks, the Cleveland district remains one of the tightest manpower centers in the nation, requiring over 5000 persons in key jobs. Since the first of the year over $300 million in war contracts have been placed in the district.

Federal manpower authorities have reshuffled their statistics and last week in the wake of Selective Service promises of more liberal draft deferments for men 30 years or over came up with new results. These are: 1, Despite a 25 per cent cut in draft calls starting July 1 industry stands to lose more young men now working in war jobs, probably about 50,000 a month. 2, Manpower needs for direct war work will drop by 2,800,000 within the next three months and by 4,700,000 within six months. 3, Unemployment within the next year will total no more than 2,100,000 persons at any one time if WPB can make materials available in sufficient quantity for reconverted plants to start producing civilian goods. These figures are tentative and subject to the assumption the Japanese war will last for at least another year.

CONSTRUCTION AND ENTERPRISE

MICHIGAN

DETROIT—Cyclomatic Corp., 4131 West Jefferson avenue, has been incorporated with $20,000 capital to manufacture machine products, by Eli Freed, 5440 Cass avenue.

GRAND RAPIDS, MICH.—Michigan Metallurgical & Sales Service Corp., 313 Murray building, has been incorporated with $20,000 capital to furnish metallurgical engineering service, by A. S. Corbeau, 623 Windsor Terrace SE, Grand Rapids.

KALAMAZOO, MICH.—Non-Ferro Founders Inc., 460 North Church street, has been incorporated with 2500 shares no par value to manufacture and sell metal products, by D. G. Slee, 1215 West Bancroft street, Toledo, O.

LANSING, MICH.—Duo-Therm Heating Division of Motor Wheel Corp. plans postwar plant additions costing about $2 million.

MUSKEGON, MICH.—Hyper Milling & Mfg. Co., 1355 Spring street, has been incorporated with $50,000 capital to manufacture metal-cutting tools and machinery, by L. E. Becker, 300 Michigan Trust building, Grand Rapids, Mich.

FLINT, MICH.—Buick Motors Division of General Motors Corp., Detroit, has revised plans by Albert Kahn Associated Architects & Engineers Inc., 345 New Center building, Detroit, for Plant 12, to cost about $200,000.

CONNECTICUT

NEW LONDON, CONN.—New England Collapsible Tube Co., 170 Broad street, will build a four-story and basement plant 55 x 70 feet, to cost about $65,000. L. F. Caproni, Chapel street, New Haven, Conn., is architect and P. D. Harrigan, 37 Whitney avenue, New Haven, is engineer.

SANDY HOOK, CONN. — Watkins Machine Shop, Glen Road, plans to rebuild its burned shop at cost of about $45,000.

STAMFORD, CONN.—Electronic Rubber Co., 69 Sunnyside avenue, has plans by D. Mansell, 24 Park Row, for a one-story factory and boiler plant 50 x 150 feet, on Fairfield avenue.

STAMFORD, CONN.—Atlas Powder Co., 269 Ludlow street, has let contract to Samworth-Hughes Co., 177 Van Houten street, Paterson, N. J., for a two-story 40 x 100-foot plant costing about $42,000. J. W. Hanson, Delaware Trust building, Wilmington, Del., is engineer.

RHODE ISLAND

PROVIDENCE, R. I.—Kestenman Bros. Mfg. Co., 150 Chestnut street, will let contract soon for a one-story 80 x 280-foot plant on Kinsley street, to cost about $85,000. Barker

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MASSACHUSETTS

GARDNER, MASS.—Department of Public Works, City Hall, has plans under way for postwar construction of a sewage treatment plant on West Broadway, to cost about $275,000. E. J. Teir, City Hall, is city engineer.

SPRINGFIELD, MASS. — Standard Electric Time Co., 89 Logan street, will let contract soon for a one-story plant addition costing over $40,000. McClintock & Craig Inc., 458 Bridge street, are architects.

NEW YORK

BROOKLYN, N. Y.—American Safety Razor Corp., 315 Jay street, Milton Dammann, president, plans to increase manufacturing facilities at its Brooklyn, Hoboken, N. J., and London, Eng., plants as soon as government approval and necessary materials can be obtained.

BINGHAMTON, N. Y.—City plans postwar construction of garbage disposal plant costing $150,000, state aid planning funds being allotted.

NORTH TONAWANDA, N. Y.—Durex Plastics & Chemicals Inc. plans $3 million postwar expansion. Harry D. Dent is president and chairman of the board.

PENNSYLVANIA

CORAOPOLIS, PA.—Standard Steel Spring Co. has received WPB authorization to make alterations to buildings, rearrangement of equipment and installation of jigs, dies, fixtures, etc., for production of automobile springs, at cost of $551,400.

LESTER, PA.—Westinghouse Electric Corp., 327 Boulevard of the Allies, Pittsburgh, will let contract soon for test cells costing about $185,000. L. C. Mechling, care owner, is engineer.

OIL CITY, PA.—Quaker State Oil Refining Co. has been authorized by WPB to build a boiler-house addition and install a 90,000-pounds-per-hour powdered coal fired boiler, air preheater and auxiliaries, to cost $135,000.

PHILADELPHIA—Pennsylvania Range Boiler Co., Twenty-fourth street and Washington avenue, has let contract to Jack S. Steele Co., 1316 Arch street, for rebuilding its manufacturing plant at cost of $200,000 to $300,000.

OHIO

CLYDE, O.—Clyde Porcelain Steel Corp., T. E. Stokes, vice president, has let contract to Steinle-Wolfe Construction Co., 1515 Groghan street, Fremont, O., for a one-story 150 x 216-foot plant, estimated to cost about $109,000. C. H. Shiveley, 400½ Groghan street, is architect.

HAMILTON, O.—Estate Stove Co. has received WPB authorization for a plant addition and installation of boiler, stoker and conveyor to increase production of shell containers, to cost $90,330.

HAMILTON, O.—Fisher Body Division of General Motors Corp., Detroit, T. P. Archer, vice president and general manager, General Motors building, Detroit, has plans under way for postwar construction of a two-story automobile body plant, to cost about $4,000,000. Albert Kahn Associated Architects & Engineers, 345 New Center building, Detroit, are consulting engineers. A. F. Kisinger, First National Bank building, Hamilton, O. is associate engineer.

MARION, O.—City, Municipal building, T. Cathers, city engineer, plans postwar modernizing of sewage treatment plant costing $290,000 and additional sewers, $400,000.

MIDDLETOWN, O.—Sorg Paper Co. has been granted WPB authorization for a powerplant addition to house new boiler and water treating equipment to enlarge paper production, to cost $475,750.

INDIANA

TERRE HAUTE, IND.—City, V. J. Millan, mayor, plans postwar sewage disposal plant to cost about $2,500,000.

LOUISIANA

BATON ROUGE, LA.—Interstate Oil Pipeline Co., N. B. building, Baton Rouge, plans erection of three booster pumping stations in Mississippi, to cost over $75,000 each.

WEST VIRGINIA

ALLOY, W. VA.—Electro Metallurgical Co., New York, has been given WPB authorization to install equipment for enlarging production of ferrochrome at its plant here, at cost of $145,000.

MISSOURI

ST. LOUIS—General Engineering & Mfg. Co., 1523 South Tenth street, plans plant, including one-story 240 x 280 feet and two-story 70 x 100 feet, in 3400 block of Maury avenue, to cost about $400,000.

ST. LOUIS—George C. Dischert, 4050 Shreve avenue, has bought a two-acre tract at 4417 Clayton avenue, which will be used by a company now being formed as site of a manufacturing plant containing 80,000 square feet of floor space.

ST. LOUIS—Edwin C. Brendeck has let contract to George L. Cousins Co., 875 North Skinker boulevard, for a one-story factory and repair shop 65 x 115 feet at 3035 Washington avenue. Study, Farrar & Majers, Arcade building, are architects.

ST. LOUIS—General Engineering & Mfg. Co., 1523 South Tenth street, plans manufacturing plant at 3400 Maury street on plans by William C. Wallace, architect, 2105A Alfred avenue, 240 x 280 feet, including two 10-ton crane runways; office building two stories 70 x 100 feet.

ST. LOUIS—Hercules Die Co., 4722 Newcomb Place, has let contract to H. B. Deal & Co., 1218 Olive street, for altering and improving a one-story 135 x 185-foot building, including installing heat treating furnaces and other equipment, at 3405 Morganford Road, to cost over $40,000 with equipment.

ST. LOUIS—Missouri Pipe Fittings Co., 2318 Randolph street, has plans by O. K. Krieg, 3624 South Broadway, for altering various buildings in a factory group recently acquired and constructing shipping docks and ramps, to cost over $40,000.

WISCONSIN

MILWAUKEE—Badger Tool & Engineering Co., 3364 West Hopkins street, has let contract to Gebhard-Berghammer Co., 5420 West State street, for a one and two-story 27 x 100-foot machine shop and office addition. Brimeyer, Grellinger & Rose, 730 North Jackson street, are architects.

TEXAS

DALLAS, TEX.—Better Monkey Grip Co., L. M. Everett, Arlington, Tex., has plans under way by Flint & Broad, Burt building, for a one-story 100 x 300-foot manufacturing building, to cost about $100,000.

HOUSTON, TEX.—L. Krausse, of Krausse Mfg. Co. and Krausse Tool & Engineering Co., 3603 Clinton drive, San Antonio, plans postwar construction of two manufacturing buildings for production of toolroom equipment, to cost about $500,000.
called soon for a proposed $30,000 municipal disposal plant, plans for which have been approved by FWA. J. W. Bouton, Boise, Idaho, is engineer. (Noted May 14.)

CALIFORNIA

FRESNO, CALIF.—Mazzei-Hill Aeronautics Inc. has been incorporated with $75,000 capital by Fred M. Mazzei and associates. Dearing & Jertberg, Pacific-Southwest building, are representatives.

LONG BEACH, CALIF.—Genero Machine Works, formed by Leon C. Genero, has established operations at 220 East Pacific Coast Highway.

LOS ANGELES—Albright Co. has been formed by Paul R. Paramore to conduct an industrial engineering, tooling and manufacturing business at 1220 Glendon avenue.

LOS ANGELES—Union Machine Co. has been formed by Theodore Schatzle to do tool and die manufacturing at 4500 Brazil street.

LOS ANGELES—Allied Fabricators has been formed by Lester D. Tennyson and associates to do general manufacturing and fabricating at 1491 West 182nd street.

LOS ANGELES—General Hoist & Body Works has been organized by Joseph J. Buehler and Ned Potz to manufacture and repair hydraulic hoists, frame work and general truck repairing at 7711 South Alameda street.

LOS ANGELES—Pattern Engineering Co., organized by Lester A. Ulberg, has established its plant at 4566 Rolando boulevard.

LYNWOOD, CALIF.—Coast & Sperline Tool Co. has been formed by Sam B. Coast and Virgil A. Sperline to do general grinding, at 3311 Fernwood avenue, in suburban Los Angeles.

NORTH HOLLYWOOD, CALIF.—Crest Mfg. Co., machine and grinding shop, has been formed by J. E. B. Daniel and associates and has been established at 4922 Lankershim boulevard.

NORTH HOLLYWOOD, CALIF.—Carroll Co. has been formed by T. C. Kegerreis to do industrial and manufacturing business at 4151 Tujunga boulevard.

SOUTH GATE, CALIF.—Garland Engineering Co. has building permit for erection of a machine shop and office at 4120 Ardmore avenue, at cost of about $15,000.

OREGON

GEARHART, OREG.—Voters have approved $30,000 bond issue to finance reconstruction of the municipal water system. R. H. Corey, Portland, Oreg., is engineer.

MEDFORD, OREG.—A special election will be held June 22 on proposed $1 million bond issue, which includes $231,000 for disposal plant, $482,000 for storm sewer system and $35,000 for a bridge replacement. Cunningham & Associates, Portland, Oreg., are engineers.

PORTLAND, OREG.—William Saramui, Portland, is low at $20,093 to the state highway commission for a truss span bridge over South Santiam river.

DPC Authorizes Plant Expansion, Equipment

Defense Plant Corp. has authorized the following expansions and equipment purchases (figures are approximate):

Joliet Industrials Inc., Joliet, Ill., $260,000 to provide equipment at a plant in Joliet for production of silica gel.

Rohm & Haas Co., Philadelphia, maker of sheet plastics, $30,000 increase in contract to provide additional equipment at a plant at Knoxville, Tenn., making overall commitment $3,370,000.

Lempco Products Inc., Bedford, O., $180,000 increase in contract to provide additional equipment at plant of J. & L. Steel Barrel Co., Oil City, Pa., a subcontractor, making overall commitment $2,260,000.

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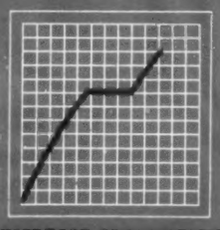

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